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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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CONTENTS.

	Page
A SECOND REPROT ON THE RETURN OF SALMON MARKED IN 1915, IN KLAMATH RIVER—*J. O. Snyder*	1
THE IDENTIFICATION OF TROUT—*J. O. Snyder*	10
CALIFORNIA'S LARGE GAME ANIMALS—*M. Hall McAllister*	11
THE BLACK BEAR IN RELATION TO STOCK—*J. Bruce*	16
SALMON FISHCULTURAL OPERATIONS ON THE KLAMATH RIVER—*H. C. Bryant*	19
EDITORIALS	24
FACTS OF CURRENT INTEREST	37
NOTES FROM THE STATE FISHERIES LABORATORY	40
CONSERVATION IN OTHER STATES	41
UNITED STATES FOREST SERVICE COOPERATION	43
REPORTS	44
Expenditures	44
Fishery Products	38

A SECOND REPORT ON THE RETURN OF KING SALMON MARKED IN 1919, IN KLAMATH RIVER.

By J. O. Snyder, Stanford University.

In the fall of 1919 a marking experiment was undertaken at the request of Mr. W. H. Shebley, in charge of fishculture, the purpose of which was to obtain additional facts relating to the life history of artificially propagated king salmon. Eggs were taken from Mill Creek, a tributary of the Sacramento River, in November, 1918, and hatched at Fall Creek Hatchery on the Klamath River in February, 1919. Approximately 250,000 of the resulting fry were placed in a rearing pond connected with the hatchery. These were fed and cared for until November, 1919, when they were liberated in Klamath River. In the meantime 25,000 of them were marked by removing the adipose and right ventral fins.

It is presumed that these fish, both marked and unmarked, made their way down the river and entered the sea shortly after liberation. However, nothing was learned of them until the latter part of October, 1920, when some appeared at the racks in Klamath River, a short distance from Hornbrook. Between October 24 and November 14, twenty-

three fish, then three-year-old grilse, bearing the mark of this experiment were secured. An account of the experiment and the results obtained to date appeared in CALIFORNIA FISH AND GAME, Vol 8, No. 2.

It was expected that four-year fish of the same lot would be taken during the following season, 1922, and considerable effort was made to secure the cooperation of fishermen and others in obtaining data relating to them.*

Scales and mutilated fins of 7 examples caught at sea, one in the estuary of Klamath River, and fifteen from the racks near Hornbrook, were collected. Reports were received of others having been seen, and also a few deformed fins from fish which had evidently met with accident were examined. Collectors' data relating to the marked fish are here assembled.

TABLE 1.

Summary of collector's data relating to marked fish taken in 1922.

Number	Date	Locality	Sex	Length, centimeters	Weight, pounds	Collector
21751	June 7	Monterey Bay	F.	75	9½	A. Paladini Co., E. M. Nielsen.
21752	June 11	Monterey Bay	M.	79	14½	L. Canepa, Boat 85, A. Paladini Co., E. M. Nielsen.
21756	July 21	Near Redding Rock	F.	64	7¼	Western California Fish Co.
21757	Aug. 1	Near Redding Rock	F.	73	10½	E. C. Seofield.
21758	Aug. 3	Near Redding Rock	M.	73	11½	E. C. Seofield.
21759	Aug. 3	Near Redding Rock	F.	77	11¾	E. C. Seofield.
21760	Aug. 5	Near Cape Mendocino	M.	74	10¼	E. C. Seofield.
39386	Aug. 14	Klamath Estuary	F.	72	10	Klamath River Packing Assn. Frank A. Douglas.
21762	Oct. 19	Klamath racks near Hornbrook	F.	79		Fish and Game egg taking station, E. V. Cassel in charge.
21763	Oct. 28	Klamath racks near Hornbrook	M.	77		
21764	Oct. 30	Klamath racks near Hornbrook	M.	69		
21765	Oct. 31	Klamath racks near Hornbrook	F.	74	-----	E. A. McGregor.
21766	Nov. 1	Klamath racks near Hornbrook	M.	64	-----	E. A. McGregor.
21767	Nov. 3	Klamath racks near Hornbrook	M.	84	-----	E. A. McGregor.
21768	Nov. 6	Klamath racks near Hornbrook	M.	84	-----	E. A. McGregor.
21769	Nov. 8	Klamath racks near Hornbrook	M.	80	-----	E. A. McGregor.
21770	Nov. 8	Klamath racks near Hornbrook	M.	68	-----	E. A. McGregor.
21771	Nov. 8	Klamath racks near Hornbrook	F.	86	-----	E. A. McGregor.
21772	Nov. 9	Klamath racks near Hornbrook	F.	86	-----	E. A. McGregor.
21773	Nov. 10	Klamath racks near Hornbrook	M.	84	-----	E. A. McGregor.
21774	Nov. 10	Klamath racks near Hornbrook	F.	86	-----	E. A. McGregor.
21775	Nov. 11	Klamath racks near Hornbrook	M.	83	-----	E. A. McGregor.
21776	Nov. 15	Klamath racks near Hornbrook	F.	74	-----	E. A. McGregor.

Among other things, this experiment has served to demonstrate beyond doubt that king salmon may range a long distance at sea from the mouth of the parent stream, a matter of great importance in relation to conservation. The salmon caught in Monterey Bay, off San Francisco, and in the Sacramento River have heretofore been considered as a unit statistically and otherwise, in accordance with the supposition that all were a product of the Sacramento basin. This view must now be

*Wardens whose stations were near the coast, were on the lookout from Monterey to Crescent City. E. A. McGregor and E. C. Scofield acted as special observers at Fort Bragg and Eureka; the writer was stationed at the mouth of Klamath River. McGregor was present at the spawn-taking operations near Hornbrook, and finally, willing cooperation and aid were rendered by many fishermen, dealers, and packers.

abandoned, for it was recently shown that Sacramento salmon may migrate northward at least to Shelter Cove, and now there is evidence that Klamath salmon contribute to the catch of Monterey Bay. The experiment also lends aid to the theory that king salmon return to the stream in which they were liberated, regardless of where the eggs were taken.

It will be seen that the sex representation among the marked fish recovered this season is practically even, there being 12 males and 11 females.

The average length of those caught at sea was about 73.5 centimeters, while the mature examples taken later in the river measured about 78. This is similar to the growth attained by stream fish of natural propagation as shown by 60 examples selected at random from the catch of 1919 at the mouth of the Klamath. The sexes of these were equally represented, and they were fish which had spent the greater part of the first year in the river, as indicated by the structure of the scales. The lengths varied from 65 to 80 centimeters, the average being 73.

It will be of interest to continue with similar comparisons. It has been shown that in most cases the size of a salmon at any stage of its growth, may be approximately computed if the length of the fish is known, and some of its scales are available for examination.* The method employed takes advantage of the fact that the scale grows in proportion with the rest of the body, and the structure of the scale is such that it preserves a record of some of the chief incidents in the life of the fish in such a way as to often admit of more or less accurate interpretation. The growth of the scale proceeds from a nuclear center outwards, in concentric rings, forming a succession of minute ridges, each of which for a short time represents the edge or contour of the scale. The scale thus presents in miniature a picture or sketch of the life history of the fish, which records certain events in regular succession. If the growth is rapid and uninterrupted, for a time, the rings are broad and even; if for any reason the growth is retarded, the rings will be narrow or closely crowded.

Figure 2 is a photomicrograph of a portion of a salmon scale (No. 21751 in Table 1) including the nucleus and parts of the opposite edges. The small oval x, represents the scale when it first appeared in the skin, the fish then being approximately 4 centimeters long. The point A marks the edge of the scale when the fish was released from the breeding pond. From A to D is the growth to what may be termed the end of the second year; to E the end of the third year; from E to F, a part of the fourth year. Since the scale grows in proportion with the rest of the fish, the length of the fish at any time will bear a definite relation to the length of the scale at that time. For example, the length of the fish at the end of the third year, is to the length of the scale at the end of the third year, as the present length of the fish, is to the present length of the scale; in this case, L:92::75:128, giving about 54 centimeters as the length of the fish when three years old. In this calculation no account was taken of the growth represented by the small area marked X in the figure, a matter of about

*Dahl, Knut; The age and growth of salmon and trout in Norway as shown by their scales—London, 1910. The method described by Dahl has been employed by Doctor C. H. Gilbert and others in investigations of western salmon.

four centimeters. With this correction the computed length at the end of the third year would be about 55 centimeters. Here the measurements were made of a magnified image instead of the scale itself, and in practice the camera lucida is used.

A table of computed lengths at three stages of growth of the marked fishes taken at sea and in the Klamath estuary* follows:

TABLE 2.

Number	First year	Second year	Third year	Fourth year (actual length)
21751	7.3	36	55	75
21752	7.9	34	58	79
21756	8	31	53	64
21757	8.5	31	56	73
21758	9.9	28	51	73
21759	7.2	34	60	77
21760	8.3	31	50	74
39386	7.2	31	56	72
Average	7.9	32	55	73

According to the table, these individuals measured on the average about 7.9 centimeters when liberated in the river, 32 when two years old, 55 when three years old, and 73 when they met death in the fourth year. These calculated measurements compare favorably with those obtained in another way as will be seen. One hundred fingerlings were taken at random from those liberated in 1919. These measured from 7.1 to 11 centimeters, the average being about 8.5. Fifty fish in the third year, and with a similar stream history, taken in Monterey Bay between April 25 and June 27, averaged about 55 centimeters. Also measurements like those given in the above table were computed from the scales of 60 four-year-old Klamath River examples with a similar stream history, resulting as follows:

	First year	Second year	Third year	Fourth year
Average males	12	35	55	71
Average females	11	34	57	74

From these comparisons it seems safe to infer that the growth of these pond-reared fish has progressed at about the same rate as others, and that when mature they reached about the same size.

The return of three-year fish bearing the mark of 1919 was noted on a previous page. These fish were distinguished by a peculiar and characteristic second year record borne by their scales, an illustration of which is presented as figure 3. Like that shown in figure 2, this scale has a nuclear area A, beyond which the rings are wider and very regular to the point B. From B they are still wider to C, where a check in growth is recorded by a space of two or three irregular and narrow rings. Beyond this the growth is resumed, only to be checked again at D. The space between A and D represents the growth from the time the fingerlings were liberated until the end (winter) of the second year. It is very probable that the check B occurred during the

*Scales from fishes approaching the spawning period, like those taken at the racks near Hornbrook, are too badly absorbed or frayed along the edges to be useful in this way.

first winter, about the time the fish was one year old, the entire growth of the first year being from A to B. However, speculation as to the time or cause of the checks B or C is of little moment compared with the mere fact of their presence, not only in the scales referred to, but also in all but three of the 46 fish (two more are illustrated in figure 4) which were captured last year and this, bearing the 1919 mark. These checks are to be interpreted as the records of certain events which retarded the growth of each of these fishes at the same time and in a similar way, and their presence in all, or nearly all, would lead one to infer that they were closely associated during the second year. Some explanation other than exposure to the same environment during the growth of the second year may perhaps be found for the remarkable similarity of scale structure in all these individuals, but none more simple or plausible comes to the writer at this time.

As the marked fish were only a small part of the 250,000 liberated at the same time, it was suspected that many unmarked individuals might be associated with the marked ones wherever the latter were found, and that such might be recognized if they possessed the same peculiar scale structure as the marked ones. Accordingly, on the day when the first marked one appeared in the estuary of Klamath River, the scales of many other fish were examined, but without success. It was like searching for the proverbial needle in a haystack, for there were at the time, 4632 large fish on the cannery floor. However, better results followed an examination of the sea catches. As the Eureka observer, Mr. Scofield, discovered marked fishes, he preserved scales from all other individuals in the same boat, and a search among 155 of these revealed six which the writer is satisfied may safely be regarded as fishes of the 1919 planting. A scale of one of these is illustrated as figure 5, and it is only necessary to place it alongside of figures 3 and 4 to be convinced of its detailed structural resemblance to them. Collector's data relating to these are here tabulated.

TABLE 3.

Number	Date	Locality	Sex	Length
41853	August 1	Vicinity Redding Rock	male	66
41854	August 1	Vicinity Redding Rock	male	77
41995	August 5	Off Cape Mendocino	female	69
41997	August 5	Off Cape Mendocino	female	67
42021	August 5	Off Cape Mendocino	female	72
42043	August 5	Off Cape Mendocino	female	87

Each of these fish was in its fourth year. Measurements similar to those presented in Table 2 are here recorded for purposes of comparison:

TABLE 4.

Number	First year	Second year	Third year	Fourth year (actual length)
41853	9.5	37	47	66
41854	10	39	65	77
41995	10	35	54	69
41997	10	30	49	67
42021	9	29	55	72
42043	9.5	32	58	87
Average	9.6	34	55	73

The structure of that part of the scale produced during the third and fourth years offers nothing peculiar or distinctive. The time and place of capture of the marked fish do not disturb the supposition that they may have all been taken from the same large school which was passing along the coast in pursuit of food. The first marked fish of the season were caught in Monterey Bay in June. They were next met far to the north near Redding Rock, then off Cape Mendocino at a later *date, in the estuary of the Klamath, August 14, and finally in the upper Klamath River in October and November.

It is probable that others of this planting still remain in the sea, either to be caught during the coming season or to return to the spawning grounds later in the year.

*The table, No. 1, gives July 21 to August 3, as dates upon which marked fish were taken at Redding Rock, and August 5 as the time of catching those at Cape Mendocino. These were the dates of arival of the fish at Eureka. Either may have been taken a day earlier.

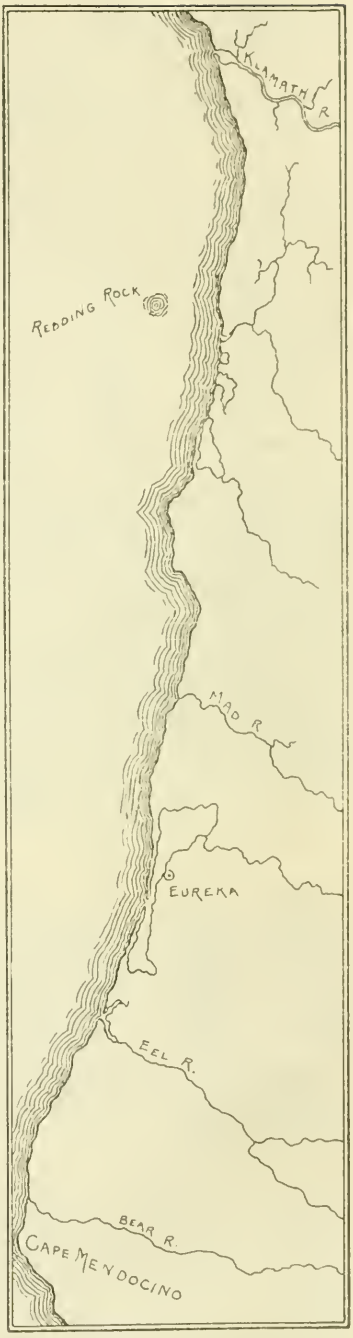
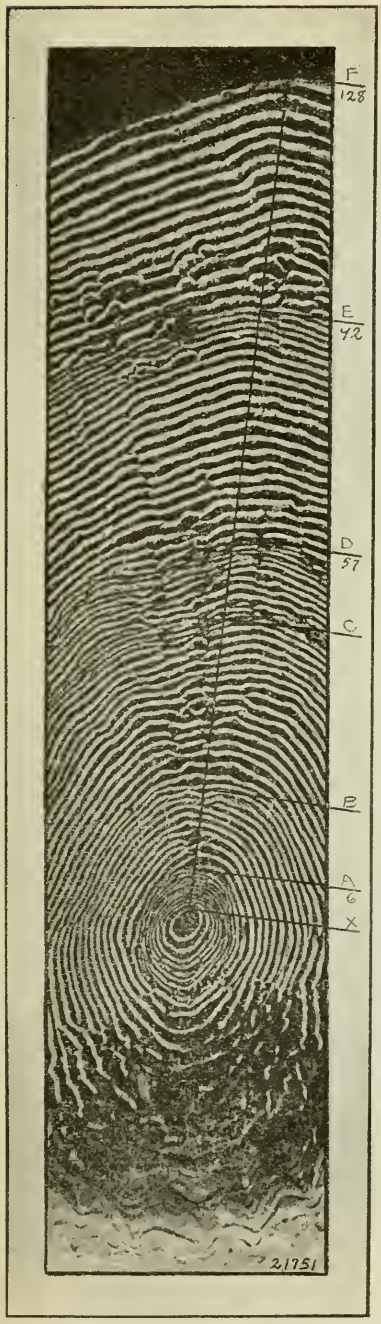


FIG. 1. Map of northern California coast, showing mouth of Klamath River and salmon fishing grounds.



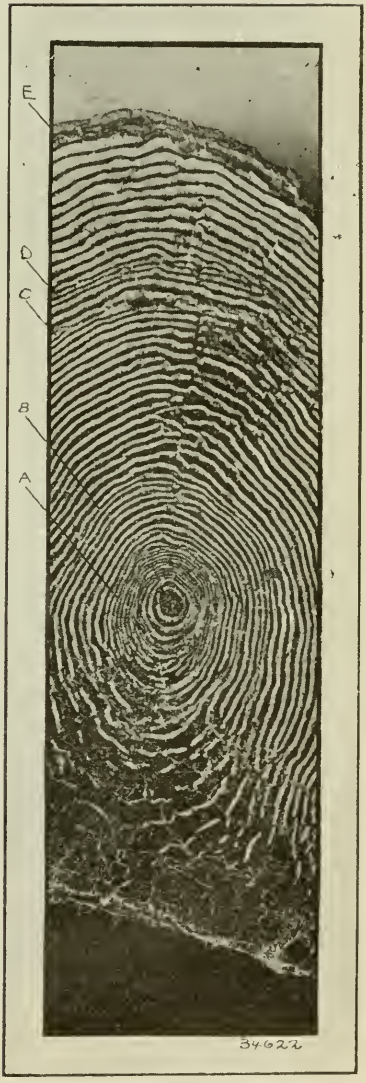


PLATE 1.

FIG. 2. Photomicrograph of a scale from a marked king salmon taken in Monterey Bay, June 7, 1922; a female measuring 75 centimeters in length.

FIG. 3. Photomicrograph of a scale of a marked king salmon which matured in the third year and returned to the upper Klamath River in 1921.

PLATE 2.

FIG. 4. Photomicrograph of scales of two king salmon caught at sea in the fourth year of their age.

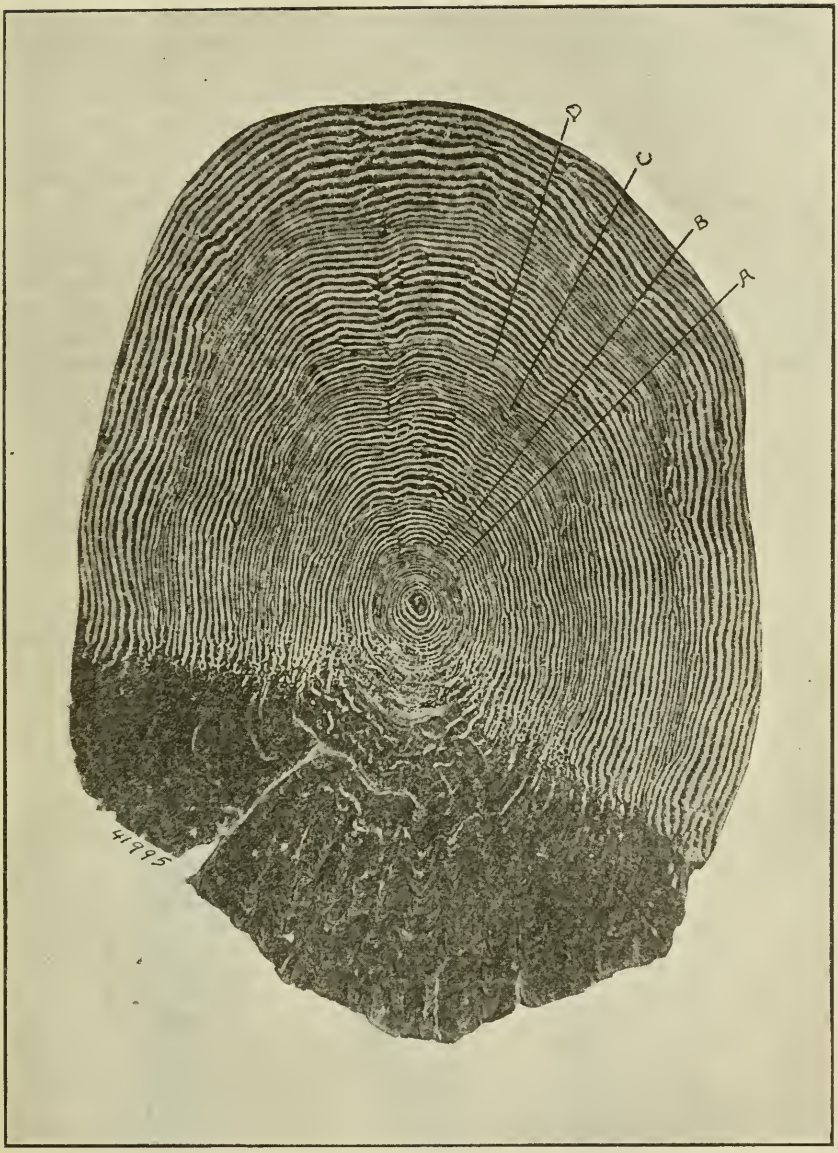


PLATE 3.

FIG. 5. Photomicrograph of a scale of a salmon taken off Cape Mendocino, August 5, 1922, which shows convincing structural resemblance to scales of fish of the 1919 planting.

THE IDENTIFICATION OF TROUT.

By J. O. Snyder, Stanford University.

Anglers are generally interested in knowing the fish which they catch, and some species, especially the trout, offer considerable difficulty and occasionally cause an appeal for identification to the ichthyologist. In most cases the request is not accompanied with sufficient information to permit of an intelligent answer. Color, particularly that of the flesh, which is extremely variable, is usually emphasized while anatomical structures of importance are overlooked. Professor J. G. Brown of Stanford University lately discovered a method of preparing the necessary data which is at the same time ingenious and efficient.

Four species of trout were being caught by the members of a party of anglers in the high Sierra, and as a result of discussions relative to their identity, a specimen of each was prepared for future reference. Instead of taking off the skin, or salting the fish, or preserving it in spirits—of which the supply was probably low, the fish was simply

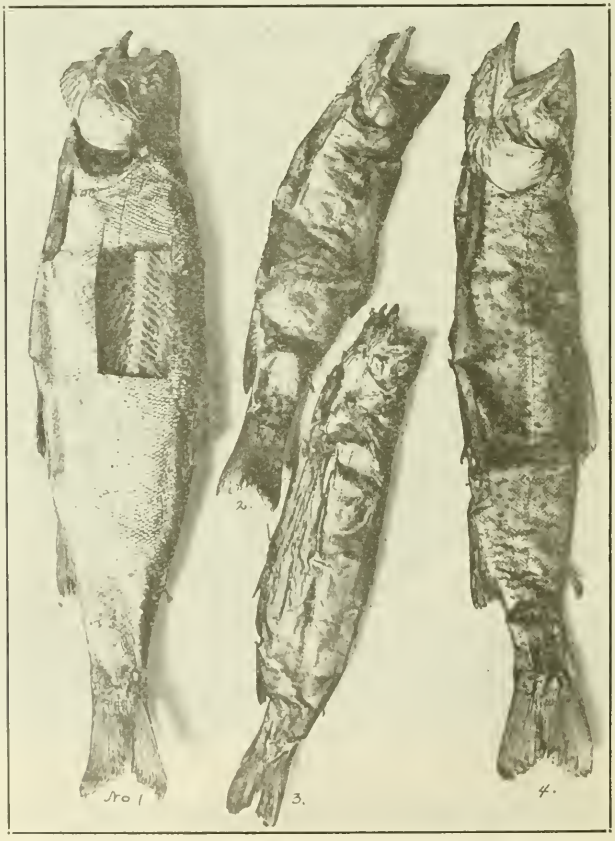


Fig. 6. Specimens of rainbow, Tahoe cutthroat, eastern brook and golden trout, suitably preserved for identification.

eviscerated and hung up in the shade. Yellowjackets finished the job, leaving a perfect skin, nicely prepared skeleton, teeth, gillrakers and all, even the cornea of the eye. In all cases the dark pigment of the skin was perfectly preserved, the spots being as plain as in life, and much of the delicate golden tint and the silvery sheen were evident.

Professor Brown relates that when an unusually ambitious yellowjacket began to gnaw some vital part like the skin along the edge of a cut, or a natural opening of the body, all that was necessary to stop him was the application of a bit of vaseline, not to the bee of course, but to the part that was being eaten.

In the photograph here presented, one is able to recognize the rainbow (No. 1) and the Tahoe cutthroat (4). The skins of the brook trout (2), and also the golden trout (3), were equally well preserved, but the plate was not sensitive to their delicate colors. The incision in the skin of the rainbow permits a section of the nicely cleaned skeleton to be seen. A light spray of an alcoholic solution of corrosive sublimate applied in the laboratory, will protect the specimens from the ravages of insects, and there seems to be no reason why they should not be kept for years.

The rainbow trout was taken in Babcock and Emeric lakes, and also in Fletcher Creek, the brook trout was found in Babcock Lake, the cutthroat came from Emeric Lake and Fletcher Creek, while the golden trout was caught in Fletcher Lake and the creek of the same name. Fishing was reported good, there being an abundance of trout in these lakes and streams. The fish were all introduced, none being natives of the basin which is in the midst of the mountains not far to the eastward of Yosemite Valley.

CALIFORNIA'S LARGE GAME ANIMALS.

By M. Hall McAllister.

Under the leadership of the California Academy of Sciences and in cooperation with several Eastern societies a united effort is now being made to regularly care for the various remnants of the great herds of large mammals that formerly ranged over the great West and the states of California, Nevada and Oregon.

A fund is being gotten together by the following subscribers:

The American Bison Society of New York.

New York Zoological Society Wild Life Fund.

California Fish and Game Commission.

United States Forest Service.

California Academy of Sciences.

This money will be handled by a regular committee of the Academy and will be expended for the purposes of winter feed for the herds; salaries of gamekeepers; expenses of forming refugees, and general supervision and observation.

To give an idea of what has already been done in large game conservation and preservation the following will give the details.

Buffalo—One hundred years ago these animals ranged over practically the whole of North America from the Appalachian regions in the

East to the Rocky Mountains in the West, and from Canada's muskeg swamps to Mexico's northern plains.

From 1860 to 1870 the herds were estimated:

Great southern herd	3,500,000
Great northern herd	1,500,000
Total	5,000,000

Say a total of five million animals.

In those days on the western plains these mighty hosts of buffaloes frequently stopped or derailed railroad trains and even obstructed the passage of small river boats on the upper waters of the Missouri and Yellowstone rivers.

In 1869 the Union Pacific Railroad was completed and in about ten years this greatest herd of one species of animal on the globe was completely annihilated. The southern herd on the line of the Union Pacific was first to go; it was savagely attacked by the skin hunters and by 1875, with the exception of three small bunches had all been killed. In 1880 the Northern Pacific was completed and a similar attack was then made on the northern herd and by the end of 1883 they were all slaughtered leaving only the Yellowstone Park herd, which was supposed to number from 100 to 200 head, and a small protected band of 40 in Custer County, Montana.

During 1890 the Yellowstone herd was attacked in the winter by poachers and reduced, some say as low as only twelve, while other estimates were between 20 and 30 head.

Theodore Roosevelt was a plainsman and saw the remnants of the northern herd in Dakota in the early 80's. In his volume "Hunting Trips of a Ranchman" he tells the story of the extermination of the buffalo and shows the head of a bison bull shot by himself in 1883. Roosevelt's brother Elliott Roosevelt, was also quite a buffalo hunter and was in at the death of the great southern herd in 1877.

Roosevelt writes: "It may truthfully be said that the sudden and complete extermination of the vast herds of buffalo is without a parallel in historic times."

There are hundreds of stories of buffalo hunts and hunting, but one of the best was written by General Lew Wallace, author of Ben Hur. He tells of a hunt on the plains of Northern Mexico in 1867. It is a remarkable description in the fact that it is one of the few authentic accounts showing how far south the buffalo migrated. This herd of several hundred animals was found about 300 miles south of the Rio Grande River, in the State of Durango, while General Wallace was making a horseback trip from Monterey and Saltillo across the Coahuila plains to the City of Chihuahua, this journey being approximately along the 26th degree of north latitude. It is, so far as known, the most southerly record of the migrations of the buffalo.

The great English sportsman Sir Samuel Baker visited America in 1881 and writes as follows: "The American bison is a grand looking creature and in my opinion it is the most striking of all wild animals; there is a peculiar savagery in the aspect of a shaggy old bull in its winter coat which surpasses in wildness of appearance all other species of game."

To show what a true sportsman this splendid Englishman was, we quote regarding a buffalo hunt in the year 1881:

"As the bullet struck within a couple of inches of the mark, this magnificent bull plunged heavily to the ground. The three remaining buffalo, all bulls, dashed through the shallow stream, and struggled up the opposing bank. I immediately reloaded and took a lovely aim between the shoulders of each bull, as it exposed itself to a deadly shot which was almost perpendicular within 70 or 80 yards; but I would not fire; I had them completely in my power and that was sufficient. Buffaloes were being destroyed wholesale, and I would not join in the brutal list of destroyers."

He then tells how he stalked from 30 to 40 of these splendid animals which he could have shot with ease, leaving them to rot on the plains, till finally his cowboy guide said: "Well, if you came all the way from the old country to shoot, and you won't shoot when you get the chance, you'd have done better to stop at home." Sir Samuel also did the same with elk and antelope after bagging his first specimens.

He writes further: "The buffaloes on many occasions fed around our camp within 300 or 400 yards. We could watch them with our binoculars and we enjoyed the study of their ways with far greater pleasure than I should have felt in shooting them."

An old time volume "Buffalo Land" published in 1872, describes the trip of a party of New York gentlemen hunters who spent the summer of 1870 in the great West and saw a lot of the destruction which went on. They recite: "During the year 1871, about 50,000 buffalo were killed on the plains of Kansas and Colorado alone. Of this number, it will be correct to estimate that about one-third were shot for their robes, as many more for meat and some 16,000 slaughtered in the name of so-called sport. This book has a series of pictures showing the various modes of slaughter, the titles being:

300 buffaloes a day for pleasure. Sportsmen on horses.
100,000 buffaloes a day for their tongues by Indians.
200,000 buffaloes a day for their robes to get whiskey by the Indians.
Daily for fun; showing shooting into herds from the railroad cars.
Daily for excitement; showing shooting while the herds are crossing the rivers.

The principal hunters and guides all seemed to have the name of Bill tacked on; their guides were Wild Bill (William Hickox); Buffalo Bill (the celebrated William F. Cody), and there was also California Bill, Rattlesnake Bill, and Tiger Bill, and they also heard of Comanche Bill and Apache Bill. But Tiger Bill had the reputation of being the "dangerest on 'em all."

The late C. Jesse Jones, known every where as "Buffalo Jones" in the 70's, did one act which saved at least one bunch from extermination. He and his cowboys roped from the great southern herd a dozen young calves, six bulls and six heifers, and took them in safety to his ranch, in Kansas. Also Colonel Charles Goodnight, of Goodnight, Texas, rounded up and saved a bunch of young stock from the same great herd.

As to the size and weight of a full-grown buffalo, Dr. Hornaday of the Bronx Zoo, who is the greatest living authority, bagged a bull in 1886 in Montana which weighed 2100 pounds. This animal is now in the National Museum in Washington. This was the record until the

large bull "Black Dog" which was bred on the government farm at Wichita, Kansas, turned the scale at 2800 pounds.

In the year 1900 the American Bison Society was formed in New York, the object being to endeavor to save this splendid species from total and entire extinction. The personnel comprised the following philanthropic men: Austin Corbin, James J. Hill, W. C. Whitney, Col. Goodnight of Texas, C. Jesse Jones (Buffalo Jones), Colonel W. F. Cody (Buffalo Bill), E. J. Molera of San Francisco, and a number of others.

Their efforts together with the active cooperation of their successors have met with complete success. On the first of January, 1923, just passed, there were in excess of ten thousand (10,000) head of buffalo in the United States and Canada.

The original score, some twenty years ago, was exactly 34 wild buffalo beside several hundred which ranged as a separate herd in the muskeg swamps of Canada near the Great Slave Lake; also several hundred tame bison on the various ranches and in parks.

The first real census of tame and wild bison in 1903 showed a total of 1753 head which in the year 1920 had increased to 8473 head and today the total is well over 10,000 animals.

The United States government has several fine herds, those of Yellowstone Park and Wichita, Kansas, being the largest and best. The Yellowstone herd has 100 wild and 500 tame bison, a total of 600 being the latest report. Of the grand total of 10,000 head, the Canadian government has about 6000 and the United States and private herds the remaining 4000 buffalo.

The Canadians are now starting to market their surplus by the sale of buffalo robes, the meat, and stuffed or mounted heads. They sent ten mounted heads to the last annual "Fur-sale" at St. Louis, where they sold for from $350 to $1,250 each.

Reindeer—The most remarkable conservation and increase of animal life has been that of the reindeer in Alaska. In 1892, just 30 years ago, Dr. Sheldon Jackson brought over the first installment from European Russia, which was followed by the United States government shipments from Siberia. A total of some 1280 animals was imported during the ten years from 1892 to 1902. The increases since that time have been phenomenal as up to January, 1922, a census shows nearly 250,000 animals distributed as follows:

Natives	162,000
Government herds	12,000
Mission herds	24,000
Others	52,000
Total	250,000

Reindeer meat is now on sale in most of the large cities in the states but does not fulfill the demand expected of same. The white man's palate has been so long used to his regular civilized meats, beef, mutton and pork, that reindeer steak or cutlets are considered as a novelty and not as a regular diet. There is some question as to its success as a seller in the United States proper. It is, however, a great boon and really an act of Providence to the Alaskan native, giving him food, and clothing without the former dangers and uncertainties of his former food supply of seal and walrus.

California Valley Elk—Before the white man arrived in California our great valleys were teeming with all varieties of game; both mammals and bird life existed in untold numbers. In an effort to keep before us some of these beautiful creatures the California Academy of Sciences with the aid of other agencies has considered the proposition of establishing game refuges in favorable localities.

The first unit has been established in the Yosemite Valley under the control and care of the National Park Service and consists of some thirty acres on the floor of the valley near the Sentinel Hotel alongside of the clear flowing Merced River and just in front of the new Rangers Club House. This is a large fenced enclosure which will be the central unit for the care and propagation of the California valley elk. This paddock will be considered as the parent or base for the breeding and distribution of the species which differs so much from the Roosevelt or mountain elk that they will not inter-breed.

FIG. 7. California valley elk in corral at Buttonwillow, Kern County, ready for shipment, by California Academy of Sciences. Photograph by John Rowley.

The original herd for this paddock came from the Miller and Lux ranch at Buttonwillow, Kern County, where at one time there was a total of 400 head. Several round-ups or rodeos have taken place and the actual count made September, 1921, showed nearer 350 head to be correct. Four catches have been made:

About 1910 Biological Survey	10 animals
1914 California Academy of Sciences	54 animals
1915 California Academy of Sciences	92 animals
1921 California Academy of Sciences	10 animals
Total	166

The above animals which were caught up and distributed have about held their own. The natural increase has about offset the losses.

The herd in the Yosemite will be kept as a base which can be fostered and cared for so this most interesting variety of the American elk, which all sportsmen and collectors call "The king of the Cervidæ," will always remain with us.

THE BLACK BEAR IN RELATION TO STOCK.

By Jay Bruce, State Lion Hunter.

An effort is being made by the stockmen of California to repeal the law protecting the black bear (*Ursus americanus*). The complaint against the bear is based on the allegation that he is destructive to stock.

I have no doubt that most of these men sincerely believe that the bear does kill stock, but I am convinced by my own experience that these men are being misled by appearance and misinformation.

I myself have hunted since I was 10 years old and have traveled on foot more than 30,000 miles over the mountains of California, hunting and trailing different kinds of game. About 1500 miles of the distance has been covered while hunting mountain lions. For several years before I was employed to hunt lions for the California Fish and Game Commission, I made a business of conducting deer hunting and fishing parties during the open season, and hunting bear, lion and bobcats during the fall and winter. At that time I found the average bear to be worth about $50, including meat, hide and the lard, which was used by my family. The same bear, if killed during the summer, would not be worth anything for any purpose.

During my many years of sportsmanship I have bagged 42 bear, 155 mountain lion, and 200 bobcats. When I entered the employ of the Fish and Game Commission on January 1, 1919, I immediately began breaking my dog from running bear, and specialized on hunting lions. Nearly all of my hunting was done when bear were from five to ten times as numerous as lions and on account of using thoroughly trained lion dogs I have had many unusually favorable opportunities to correctly check up on reports where bear were accused of killing stock. Every such report I have investigated I have found the bear to be innocent of the killing. However, I can easily realize why the average stock man gains the impression that the bear kills his stock, for while hunting bear and lion I have found hundreds of carcasses of deer and domestic stock that were killed by mountain lion and eaten by bears. The lion seeks out the bedding grounds of sheep during the night and slays several sheep in a few minutes, or he lies in the brush on the range and kills sheep during the day, in either case eating only the liver and part of the hams, leaving the balance to decay. The bear, which is a natural scavenger, is attracted to the range by the odor of the decaying carcasses and stays there, living on the kills left by the lion. The sheep destroy the lion tracks on the range, so when, on account of the odor, the herder finds the sheep carcass, the bear has already been there and trampled the ground around the kills. Then the bear is accused of making the kills.

One example of the kind was last October, while on my way into Big Squaw Creek in Shasta County, when I met a sheep man from Dunsmuir, who was driving his sheep out of the mountains for the winter. When I asked this man if his sheep had been bothered by lion during the summer, he answered that they had not, but that he had lost about a hundred sheep by bears. When I suggested that the sheep had probably been killed by lions, he very emphatically stated that they had not, as there had not been any lion or lion signs on his range at any time during the summer, but that bear signs were numer-

ous. He said, "I know it was bear's work for I know the work of bears and could not be mistaken." On the strength of this information, I immediately went onto this man's sheep range which he had just left, and bagged ten lions during nine days of hunting, and about the same time a man by the name of Morgan bagged five lions just off the western edge of the same range. Every one of these fifteen lions could have been living on sheep all summer and probably were doing so, at least part of the time.

Another example of this kind was the case of Charles Ralph, who was raising goats in Tuolumne County. Ralph had lost 300 goats one year, and he told me that there were five lions and several bears killing his goats. I bagged one large male lion on the first day, and found the lion's stomach contained goat meat. Saw signs of several bears on the range but found no more lion signs during five days of hunting. A year and a half later, Ralph wrote to me, stating that he had not lost any more goats nor seen any more lion signs. After the lion was killed, the goats were not molested. This one lion had apparently destroyed 300 goats in one year, and several bear had been living on the kills after they were abandoned by the lion. Naturally the bear was blamed for part of the damage.

While I was hunting lions in El Dorado County last August, in company with Mr. Frank Newbert, we were informed two lions had killed one hundred sheep within twenty-five days, at the head of Alder Creek. Mr. Newbert and I arrived at this range about two days after the sheep had been moved out, but a cattle man by the name of Johnson took us to where one lion had killed a sheep about three days before. We could plainly see by the tracks that the lion had killed the sheep and dragged it for about a half mile and hidden it in a thicket of fir saplings. We found the remains of several sheep near this thicket and all of them had been devoured by bears, only the hide and bones remaining. We trailed this lion, which was a very large male, for about a mile and then found the fresh track of a lioness, which we followed until two o'clock in the afternoon when we found where the carcass of a sheep had been dragged across a flat; we then followed the drag for about two hundred feet and found the kill in a thicket of fir trees. This sheep had apparently been killed about nine o'clock the evening before and two bears had already found the carcass, devoured part of it and then bedded down near by, leaving only when they heard the hound baying on the lion trail. The bears had destroyed the lion tracks and scent around the carcass, and it was necessary to circle at a distance of a hundred feet to again find the lion tracks, which we followed unsuccessfully until dark. Early the next morning we returned to the kill in order to get her fresh tracks, if the lioness had returned to the kill. The lioness had not returned but two bears had been there and devoured the remains of the sheep. I called Mr. Newbert's attention to the fact that all the evidence around the kill had indicated that the bear had killed the sheep. We then back-tracked the drag for about three hundred feet to the place where the sheep was killed. Then we could plainly see the tracks made by the lioness when she rushed over and struck down the sheep, thus proving the lioness the slayer. This lioness had apparently killed this strong sheep about 9 o'clock in the evening, dragged it to cover, taken a feed, and then left the place with no intention of returning for another feed,

for I tracked her for three days and killed her twenty-five miles from this place. During the next few days I tracked the male lion around his beat, which at one place was twenty-five miles from the sheep range. When I killed him he had almost reached the sheep range again.

A lion travels a definite beat over about one hundred square miles, usually making his rounds every four or five days; when the summer sheep range or run in its beat at any place, the lion may kill several sheep within a few minutes some time during the night, take one feed and then continue on around his beat, make a kill or two at some other point and not return to the range for several days; in the meantime, the bear is attracted to the range, where he stays, living on the sheep carcass left by the lion. Fresh bear signs are seen every day on the range and around the carcass and it is not surprising that the bear is blamed for the damage done by the lion.

In every instance that I have personally investigated where bear have been accused of killing stock, I have found the slayer to be a lion, except in a few cases where coyotes were responsible. In fact, I have never known a bear to actually kill any large animal, either wild or domestic.

The mountain lion is a strictly carnivorous animal and in his natural state demands meat freshly killed by himself. In the summer a carcass will quickly taint and in winter it will freeze; for these reasons the lion will make a fresh kill for his feed wherever possible. On the other hand, the black bear is not by nature a killer for he does not need to depend on this method for a living. While he will travel a long way to eat putrid meat, still he can get plenty without it. His food list is a long one, consisting of acorns, fruit, berries, mint, ants, yellow jackets, roots, grass and wild clover, all of which I have personally known wild bear to eat.

In my opinion the black bear is a splendid game animal, valuable for meat, lard and fur when killed in the fall or winter. I do not believe that he can be considered a menace to stock or game, but that he has been wrongly accused on general appearance for the damage done by mountain lions and coyotes, and that the complaints largely made by people who had no reliable method of investigating the circumstances, or had neglected to do so, assuming that bear signs around the carcass of stock were conclusive evidence that the bear were responsible for the loss of the stock.

SALMON FISHCULTURAL OPERATIONS ON THE KLAMATH RIVER.

By Harold C. Bryant.

Most of the salmon cultural operations of the California Fish and Game Commission are now centered on the Klamath River, the only remaining stream with a good run of salmon. It may also be explained that this same river furnishes most of the trout eggs utilized at the hatcheries, there being four egg-collecting stations on tributaries of this stream. Change from the Sacramento to the Klamath River has been necessitated because of the poor take of eggs in recent years at the United States Bureau of Fisheries' egg-collecting stations at Mill Creek and Baird, and because of a growing desire of the state to be independent of government aid. A depleted run of salmon, plus the barrier formed by the Redding Dam, have apparently been responsible for the decreasing supply of eggs on the Sacramento.

Fig. 8. Klamathon salmon spawning station. Photograph by A. S. Cheney.

Until 1918, the Commission depended almost wholly upon the United States Bureau of Fisheries for its supply of salmon eggs. This arrangement was satisfactory for many years, as an abundant supply of eggs was available from the Sacramento River stations. Fifteen to twenty millions of eggs were donated by the bureau annually. Relations have been most cordial, the federal and state bureaus working in complete harmony. Nevertheless, the Commission desiring to be wholly independent, beginning in 1918, took over the former Bureau of Fisheries' egg-collecting station at Klamathon, Siskiyou County, and since that time this station has supplied most of the eggs utilized by the state. Splendid results were to be expected for spawning operations at this point for many years previous had demonstrated the suitability of the location.

In accordance with the provisions of the law, which requires owners of dams to erect hatcheries in lieu of fishways, when dams are too high for the successful operation of a fishway, the California-Oregon Power Company, owners of the Copco dam, were required to build and equip a hatchery at Fall Creek, and to build racks and an egg-collecting station for salmon at Klamathon. This equipment cost the company about $20,000. This spawn-taking station and hatchery now form the nucleus for most of the salmon cultural operations. The racks are well built and the resulting take of salmon is very satisfactory.

The station is operated during late September and October, a crew of five or six men being necessary. Salmon are seined from the river between the racks and are placed in holding tanks pending spawning

FIG. 9. Seining for salmon at the Klamathon spawning station, November 13, 1922. Photograph by A. S. Cheney.

operations. In spawning trout the eggs are stripped from the female and the fish is returned to the stream, but in spawning salmon, the fish is first killed and then cut open and the eggs secured. This is possible in that the fish habitually die after spawning. Being still useful for food, the spawned salmon are given to residents, who are glad to smoke or cure them. In some states these spawned salmon are dried and utilized as fish food at the state hatcheries.

Investigations by the Commission have shown the average yield of the Klamath River king salmon to be 3891 eggs, the larger fish furnishing five to eight thousand eggs, and the smaller ones two to five thousand eggs. The yield of eggs in the Sacramento salmon appears to be greater. To secure the twenty millions of salmon eggs taken during the 1922 season, it was therefore necessary to catch over 5200 ripe

female salmon and as many males. Since many fish reaching the racks are not ready to spawn the number needed for a successful spawning season is very much greater. Many silver salmon are caught in the traps but it is the larger king salmon that is selected.

FIG. 10. King salmon taken at the Klamathon egg-collecting station, November 13, 1922. Photograph by H. C. Bryant.

FIG. 11. Rearing ponds at the Mt. Shasta Hatchery. Photograph by H. C. Bryant.

Large numbers of Klamath River trout are trapped along with the salmon and these are netted from the traps and allowed to continue their way up stream. Doubtless some of these same fish are spawned the following spring at Fall Creek, Bogus and Camp Creek egg-collecting stations.

The salmon eggs are immediately shipped in cans to the Mount Shasta Hatchery or to the Fall Creek Hatchery. Later, some eggs are shipped to the Fort Seward Hatchery. Two of the largest hatching houses are devoted to salmon culture at Sisson. Here the eggs are hatched and the fry held in rearing ponds. After the fry reach the fingerling stage and fall freshets come, the rearing ponds are opened and the fish allowed to enter the Klamath River, in the case of Fall Creek Hatchery, and the Sacramento River in the case of the Mount Shasta Hatchery. This simple method of planting is coming to be recognized as the best method possible.

FIG. 12. King salmon spawning on a gravel bar in the Klamath River.

Beginning in 1914, the pond system for rearing salmon to the fingerling stage was instituted in order that larger, stronger fish might be liberated. This method of handling salmon fry gives them a chance to reach the ocean without falling prey to the predatory fishes in the lower reaches of the rivers because of their better development. Two small lakes near the Mount Shasta Hatchery are rented and used as rearing ponds. Equipment now allows the holding of 20,000,000 salmon fry in nursery ponds and lakes until cold weather in the fall, when a draining of the ponds and lakes allows them to enter naturally and without any shock, their native stream. Before being removed to nursery ponds the fry are held and fed in troughs about two months. In the ponds the fry attain a remarkable growth, sometimes reaching six or eight inches in length and usually averaging four to five inches.

The California Fish and Game Commission may justly lay claim to part of the honor of giving to the world the main facts regarding the life history and habits of the king salmon, for Cloudsley Rutter, while working for the Commission in cooperation with the Bureau of Fisheries, worked out and published the first complete account of the natural history of the quinnat or king salmon (U. S. Bureau Fisheries, Bull. 22, pp. 65-141). Now the commission is winning new honors as

the result of marking experiments under the direction of Professor J. O. Snyder, of Stanford University. During the trapping operations in October, 1922, several of the fish that were marked four years ago were taken. The study of these salmon furnishes important evidence as to the age, rate of growth and distribution. The opportunity offered as a result of the trapping operations was thus properly utilized.

It is to be hoped that this increasing knowledge of the life history and habits may be instrumental in helping to solve the numerous problems confronting salmon conservationists. The present situation is such that many take the pessimistic view that salmon must eventually disappear, owing to the numerous power projects which obstruct the upstream migrations.

From a fishcultural standpoint, the situation is favorable, for hatchery problems are largely solved, but there remains the more critical one of barriers to natural increase.

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All material for publication should be sent to **H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.**

MARCH 12, 1923.

"To maintain the game supply, and at the same time to provide, if possible, fair sport for the increasing number of hunters that may confidently be expected, is one task before us."—Edward A. Goldman.

A NEW COMMISSIONER.

Announcement was made on December 12th of the appointment by Governor Wm. D. Stephens of Geo. H. Anderson as fish and game commissioner to succeed E. L. Bosqui.

Mr. Anderson is a business man of San Jose who has long been interested in fish and game conservation. When state senator, in 1901, he fathered bills for the nonsale of game. He is an ardent sportsman and angler and noted as a trap shooter.

Mr. Anderson's statement to the press follows:

Having been asked by numerous sportsmen what policy I would pursue on my entrance to the Fish and Game Commission, I want to say that I heartily indorse the policy of the present Commission as to game protection and propagation of fish, and feel that it has made a wonderful record.

I am for laws that will benefit the largest number of sportsmen and protect the game. I am also in favor of the present Federal tax bill, which has already passed the United States Senate. The Federal Government has done an immense amount of good in the protection of our wild ducks, especially in the Alaska region, and will need money to further pursue the good work it has started.

I believe in the nonsale of game, and claim that more people are now enjoying wild ducks through the courtesy of friends than before the nonsale law went into effect. With the advent of the automobile we have dozens of hunters and fishermen where we had one a few years ago, and it is up to the Commission to raise and distribute fish and protect the game to the fullest extent.

In this respect will say that the present Commission has made wonderful strides, and in entering this Commission I am joining two of the most enthusiastic and thorough sportsmen in California (Messrs. Newbert and Connell). Besides being competent, they are thoroughly honest in spending the money of the sportsmen of the state, and I hope I will be able to make as fine a record as these gentlemen have. I will surely try my best.

Permit me to thank my numerous friends for a large number of congratulatory letters and telegrams on my appointment.

Geo. H. Anderson, newly appointed fish and game commissioner.

1922 BIENNIAL REPORT.

The biennial report of the Fish and Game Commission will soon be available to those interested. It chronicles the outstanding features of the work during the past two fiscal years, and calls attention to many problems needing solution.

Arrests for violations of the game laws totaled 1221. Of this number 1108 resulted in convictions. The fines collected amounted to $33,998.80, in addition to 1289 days of imprisonment awarded. Arrests for violations of state fish laws totaled 1037, from which there were 983 convictions. Fines collected amounted to $29,028.50 and offenders were awarded a total of 994 days of imprisonment. The total number of arrests amounted to 2258, nearly 400 more than reported in 1920.

During the biennium a large amount of illegally taken fish and game was seized. The totals are of interest: Over two tons of deer meat; 4500 ducks and 500 quail; 25 tons of fish, and about 12 tons of lobsters and shellfish. All wholesome fish and game was donated to public and charitable institutions and many grateful letters of acknowledgment have been received. Considerable illegally used fishing apparatus, which was seized after being condemned in superior court, has been destroyed or sold by the board in accordance with law.

The total output of trout amounted to 40,974,000 and of salmon fry 18,037,000. The pond system established at the Mount Shasta Hatchery now furnishes an annual take of 10,000,000 eggs. Not only is this supply of eggs more dependable but the expense of securing them is much less. The fishcultural department's recommendations include enlargement of the pond system, the building of more hatcheries, the introduction of certain insect food for fishes, the establishment of a fish reserve on the Klamath River, and certain changes in the laws relating to game fish.

The Commercial Fisheries Department reports on interesting salmon marking experiments carried on to determine the age, rate of growth and distribution of the king salmon and on the fisheries investigations undertaken by the State Fisheries Laboratory.

Educational work has included lectures in the public schools, the issuance of many bulletins, and the development of instruction in natural history in the summer resorts.

Under the head of current problems such subjects as the following are discussed: the alien hunter, power dams endanger salmon run, demand for trout fry exceeds supply, grazing endangers feed conditions in game refuges, winter feeding of game, and careless hunters.

Reports of the district officers are given and the appendix contains statistical reports showing that 225,000 hunting licenses and 186,000 angling licenses are issued annually; that the fisheries of the state annually supply 20,500 tons of fish, and that 256 bounties were paid on mountain lions during 1921.

The report brings convincing evidence of the great value of the state's game resources and the extent of the conservation measures taken to conserve them.

WESTERN ASSOCIATION OF FISH AND GAME COMMISSIONERS MEETS AT SACRAMENTO.

The second annual meeting of the Western Association of Fish and Game Commissioners was held at Sacramento, December 4 and 5, 1922. President D. H. Madsen of Utah presided, and the following members were present: Hon. Chas. A. Jakways, Montana; Hon. O. M. Jones, Idaho; Hon. R. G. Parvin, Colorado; Hon. L. E. Bean, Oregon; and Hon. F. M. Newbert, California. Geo. A. Lawyer, United States Game Warden, two representatives of the United States Forest Service, one of the National Park Service and others interested were in attendance.

The first day was devoted to a discussion of methods of fishculture. The use of nursery ponds to care for the fry when first planted in the mountain streams was discussed at length, as was also the destructiveness to young trout by the great blue heron, merganser, pelican and grebe. The consensus of opinion was to the effect that these birds are so destructive to young trout that they should be removed from the protected list and means taken to reduce their numbers. It was decided that in fish propagation one fish three inches long is equal to fifty small fry planted in the stream, because of its greater ability to escape enemies. Attention was called to the poor success obtained by purchasing eastern brook trout eggs from private hatcheries since most of the eggs come from two-year-old fish and the embryos are weak. Time was also given to a discussion of the screening of irrigation ditches and of the construction of fishways. Heads of departments of the California Commission gave reports on their work.

A heated discussion on the Public Shooting Grounds-Game Refuge Bill then took place. A majority of the members expressed themselves as against further enroachment of the government in

the administration of fish and game. Mr. Geo. A. Lawyer, United States Game Warden, and Hon. F. M. Newbert, president of the California Fish and Game Commission, defended the measure. Two important points made by the opposition were the duplication of the warden work in that federal wardens will be able to make cases with reference to migratory birds only, and the difficulty to be expected in collecting a dollar license in those states where the license fees have already been raised to two and three dollars.

At the closing session the following resolutions having received the endorsement of the resolutions committee were passed unanimously by the association, with the following exception: A minority report on the proposed "Public Shooting Ground and Game Refuge Bill" was filed by the resolutions committee, and upon vote by the association the states of Oregon, Utah, Idaho and Colorado voted for the adoption of the majority report, and the states of California and Montana voted in favor of the adoption of the minority report. The majority report of the resolutions committee, having received a majority vote of all the delegates present, was declared adopted. Both the majority and minority reports were spread on the minutes of the association as follows:

Majority Report.

To the officers and members of the Western Association of Game Commissioners:

GENTLEMEN:

We, your Committee on Resolutions, to whom was referred the matter of the proposed "Public Shooting Ground and Game Refuge Bill," designated as H. R. 5823 and S. B. 1452, beg leave to report that we have had this matter under careful consideration, and after weighing all of the arguments presented for and against said measures, submit the following resolution as expressing the views of the western states thereon:

Resolved, That the Western Association of State Game Commissioners at its regular annual conference, assembled at Sacramento, California, on this fifth day of December, 1922, do hereby reaffirm the action of our association as expressed in resolutions adopted at our annual conference held at Salt Lake City, Utah, on the sixteenth and seventeenth days of January, 1922, and, be it further

Resolved, That we are unalterably opposed to the measures referred to, and assign the further reasons for our actions, to wit:

First—There is no crying need for either public shooting grounds or bird refuges in the northwest, nor is such a need apt to become acute for the next ten years. It is the contention of these states that when a condition does arise that needs supervision, that they are capable of taking care of any such situations within themselves. Consequently any immediate service that might result from such a measure would be directed to the districts demanding that service to relieve conditions already existing. These districts are the eastern states.

Second—Already the west is tired of being dictated to as to its operations and its control of natural resources by Fifth avenue, New York, and Pennsylvania avenue, Washington, D. C. The constituents of the game departments of the northwest will hold their respective representatives assembled here to a strict accounting of what they do or recommend at this time in reference to this bill. A large percentage of these people do not know there is such a bill before Congress today, and if they did know the provisions of this bill, particularly that provision demanding an additional license, there would be a general uprising of protest against this measure.

And, further, That this class of legislation is not only not for the best interests of the several states, but is contrary to and clearly a violation of the sovereign rights of the states.

L. E. BEAN.
OTTO M. JONES.

Minority Report.

To the officers and members of the Western Association of Game Commissioners:

GENTLEMEN:

As a member of the committee of resolutions of the Western Association of State Game Commissioners, I offer for consideration the following minority resolution:

WHEREAS, There is before the National Congress a measure known as the "Public Shooting Ground and Game Refuge Bill," which is herein designated as H. R. 5823; and

WHEREAS, The Association of Western States Game Commissioners in session at Salt Lake City, Utah, January 16 and 17, 1922, passed resolutions objecting to the passage of said H. R. 5823 for the reason that in the opinion of the Commissioners there present, the bill as then proposed would have curtailed the jurisdiction of the various states over their local wild life; and

WHEREAS, Certain amendments have been introduced by Congressman Anthony as follows:

Amendment to H. R. 5823 (Original Bill).

On page 7, line 9, strike out "fish, wild animal, or" and insert "migratory."

On page 7, lines 21 and 22, strike out "fish, wild animal, or wild," and insert in lieu thereof "migratory."

Amendment to Section 3.

Provided that nothing in this act shall be construed to exempt any person from complying with the provisions of the laws of the several states.

Amendment to Section 13.

(Agreed upon to placate fish interests) or except for the purpose of fishing, in conformity with the laws of the state wherein the public shooting ground or bird or game refuge so entered may be located, when conducted at such times and in such manner as will not interfere with the maintenance of such areas as migratory bird breeding grounds.

Amendment to Section 4.

(As originally written, to be submitted by Congressman Anthony on the floor of the House for section 4 as amended by the House Committee.)

Provided, That any part of the 45 per centum last mentioned or of the 10 per centum of such moneys received in any fiscal year and remaining unexpended and against which there are no liabilities at the expiration of two years from the end of such fiscal year, shall revert to the surplus fund of the treasury. The Secretary of Agriculture shall make an annual report to Congress of receipts and expenditures under this act.

Section 17.

That if any clause, sentence, paragraph or part of this act shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, or part thereof directly involved in the controversy in which such judgment shall have been rendered. And

WHEREAS, The Association of Western States Game Commissioners in session assembled at Sacramento, California, this fifth day of December, 1922, believe the fundamental principal of H. R. 5823 to be good; therefore, be it

Resolved, That when the aforesaid amendments have been passed and made a part of H. R. 5823, we approve and urge the immediate passage of the measure; and, further be it

Resolved, That we reserve our commendation of any other amendments or changes in H. R. 5823 until said changes can be considered by our association, and

It is ordered that a copy of these resolutions be furnished our several representatives and senators in congress, and that the same be spread upon the minutes of this meeting.

C. A. JAKWAYS.

Done at Sacramento this fifth day of December, 1922.

Resolutions.

WHEREAS, The Association of Western States Game Commissioners in second annual convention assembled at Sacramento, California, December 4 and 5, 1922, has received every evidence of the highly efficient manner our present hosts, the California Fish and Game Commission, has administered the laws for the conservation of fish and game in California, and has enjoyed to the limit the typically southern hospitality for which the "Golden State" is famous; now, therefore, be it

Resolved, That this association tender to Mr. Frank M. Newbert, president of the California Fish and Game Commission, and his associates, our hearty personal appreciation of the innumerable pleasant courtesies we have enjoyed at their hands, and our official recognition of the splendid precedents established and examples set in wild life work in California which might well be emulated by other states.

WHEREAS, It has been found that certain migratory birds are of no economic value in some states and are predatory in those states and whereas these same birds are beneficial in other states; therefore, be it

Resolved, That we believe the destruction or protection of these birds be worked out between the several states and The Bureau of the Biological Survey.

WHEREAS, It has come to our notice that game, fur-bearing animals, and fish taken in violation of the laws of one state are transported to a sister state and there confiscated by that state's authorities and in some cases sold by that state's officers and the money retained by them;

Resolved, That we favor a uniform law requiring the state authorities who confiscate such game, fur-bearing animals or fish, to return the confiscated property aforementioned to the authorities of the state where the same was unlawfully taken, or in case of perishable property, to sell the same and remit the net proceeds to the fish and game authorities of the state where the violations occurred.

WHEREAS, It appears that continued absolute protection for deer within the Grand Canyon National Game Preserve has resulted in a condition of overstocking, which, if continued, will be dangerous for the deer; and

WHEREAS, Such overstocking must eventually result in economic loss and might defeat the objects of the game preserve; and

WHEREAS, The great aburdance of deer in the vicinity of the Grand Canyon National Game Preserve where they may be easily observed is of great interest and value; therefore, be it

Resolved, That the Department of Agriculture and the State of Arizona cooperate in placing into effect such a plan of limited utilization of deer within the Grand Canyon National Game Preserve as will prevent overstocking, assist in obtaining a drift of deer to outside ranges and at the same time maintain an abundant supply of such game.

Election of officers resulted in Chas. A. Jakways, Montana, being elected president; Frank M. Newbert, California, vice president; the secretary to be chosen by the newly elected president.

The next meeting will be held at Gardner, Montana, next October, in order that the delegates may have a chance to visit Yellowstone National Park and be present at a buffalo drive to be staged for their benefit.

PROPOSED LEGISLATION.

The Fish and Game Commission, after careful investigation, believes that the following changes in the fish and game laws should be made by the legislature in order to properly conserve the species concerned:

1. The bag limit on deer to be reduced to one buck with branched antlers. Those who secure hunting licenses now number more than 225,000, which is 75,000 more than the present standing army of the United States. This in-

creased number of hunters, together with the ease with which hunting grounds are reached, and the increased efficiency of firearms, makes it important that the annual toll be reduced. A one buck bag limit will also make law enforcement easier.

2. The status of the salmon makes it imperative that all netting of this fish in freshwater streams be prohibited. The marked depletion of the salmon run has conclusively proved that recommendations to past sessions of the legislature relative to netting in freshwater were entirely justified and the perpetuation of this valued food fish is dependent upon increased protection of this sort. Additional legislation is necessary to conserve the salmon run on the Klamath River, which furnishes the only satisfactory supply of salmon eggs for use of the hatcheries.

3. The demand for an increased angling license to furnish funds for a larger output of trout fry should receive favorable action by the legislature. In 1911 applications for trout fry to the amount of 7,000,000 were made. This past year the demand was for 70,000,000 of trout fry, an amount far in excess of the present hatchery output. It must be conceded that a greater hatchery output is needed to keep the streams of the state stocked, and the only possible way in which this can be increased is by making funds available for enlarging the work. Since the increase is demanded by the anglers themselves, thus making the burden fall on those who will most profit, and not upon the taxpayer, no difficulty should be experienced in passing the necessary legislation.

FISH FOOD NEEDED IN MOUNTAIN LAKES.

It is coming to be definitely known that there are many mountain lakes which have been stocked with trout that support but a small number of fish because of the lack of sufficient food supply. Undoubtedly some lakes are quickly depleted of their fish because no suitable spawning grounds are available, but in other instances the one condition lacking is that of better food supply. The Commission has already tried out some experiments in transplanting insects and crustaceans, but recent successes in eastern states makes it apparent that the stocking of such lakes with some small fish would greatly improve conditions.

A lake on the E. H. Harriman estate, within forty miles of New York City, was stocked with 3,500,000 smelt fry in 1919, as a preliminary step toward establishing a food balance. In the same year steelhead trout and land locked salmon were planted. Two years later fish weighing from 2½ to 4½ pounds were taken. In that each fish caught was gorged with smelt, their rapid growth and splendid condition was attributed to this introduced food supply. Certainly such experiments mean much to the future of angling everywhere. Since the history of plants is available for many mountain lakes, there is a splendid opportunity to try out this method of improving angling.

SUMMER RESORT EDUCATIONAL WORK A SUCCESS.

The summer resort educational work of the Fish and Game Commission now carried on, as a cooperative scheme with the National Park Service in Yosemite National Park, is attracting more and more attention from summer vacationists. Each year more people plan their summer vacations so as to take advantage of the nature guide service offered in Yosemite. During the 1922 season nature guides lectured to 39,500 persons. Most of the lectures were illustrated with either lantern slides or motion pictures, and all of them either dealt directly with the life and habits of some living thing of the Park or with the conservation of natural resources.

An outstanding feature of the work is the field trips offered twice daily, when people are given a chance to obtain first hand information regarding the living things of the park. Special field trips are offered for children. On Saturdays, an all day trip to the rim of the Valley gives opportunity for study of the change of fauna and flora from an elevation of 3000 feet to an elevation of 7000 feet. On these long trips a fine chance to study deer, grouse and mountain quail is afforded. The attendance on these field trips during the summer months amounted to 3039. During the office hours, thousands of questions relative to fish and game were answered.

The Yosemite nature guide service has really been an experiment in popularizing natural history in the national parks. Its spread to Yellowstone, Glacier and Sequoia national parks, and the plan to organize it as part of the educational program of the National Park Service shows that it has filled a real need. It is gratifying to find that the California Fish and Game Commission was instrumental in starting so important an educational feature in the summer resorts of the country.

BIRD BANDING.

Few projects concerned with bird study have had so notable a boom as has bird banding. Renewed interest in this subject in America is traceable to a report of bird banding activities made by Mr. S. P. Baldwin at a meeting of the American Ornithologist's Union a few years ago. Mr. Baldwin demonstrated so clearly that many important facts regarding distribution, migration and habits could be obtained from systematic bird banding that even the government took up the matter. Now the cooperators enlisted by the government number 490 and several bird banding associations have sprung up in various localities. During the past year six thousand birds were banded and much valuable information was recorded as a result of the 2500 "returns" and "repeats" secured.

It will be remembered that not less than eight ducks banded by the United States Biological Survey at Bear River, Utah, were taken in California previous to 1920. The banding of waterfowl at Lake Scugog, Ontario, Canada, in 1920, obtained remarkable results. Within the two years following thirty-five of the 250 ducks, or about 16 per cent of them, were killed and the bands recovered. Mallards and black ducks were secured as far away as Florida and Louisiana, and a blue-winged teal was taken at Port-of-Spain, Trinidad, British West Indies.

Sportsmen of California glibly talk of a northern flight of birds and make speculations as to where these birds were reared. However, no actual evidence, other than that of Utah birds, has yet been obtained. This is the more remarkable when it is known that there are many places where successful banding operations could readily be carried on. One such place is Lake Merritt, Oakland, where thousands of pintails and baldpates gather every winter. Without injury to the birds, many could be trapped and successfully banded. Although, because of closed season to the north during the breeding season, few returns might be secured, yet the mooted point as to whether the same birds return year after year could readily be ascertained. Someone should collaborate with the government bird banding department and take up work at Lake Merritt.

THE OPEN SEASON ON DEER.

Forest supervisors are requesting a later open season on deer as a means of lessening the number of forest fires. They contend that a large number of the fires in early fall are attributable to hunters, as can be seen by a report made to the Fish and Game Commission, a summary of which is published on another page. Fortunately the demand is for the latest open season consistent with the breeding habits of deer.

If hunters can be singled out among the many recreationists in the mountains during August and September as being responsible for fires it would seem reasonable to attack the problem in this manner. But this line of attack may defeat the very end in view for the putting over of the hunting season a whole month in the Sierra with the reduction of the open season to thirty days is very likely to cause such a concentration of hunting parties within the national forests that the fire risk will be greatly increased rather than decreased. Could the hunting season be logically placed in rainy months, it would be a different matter. Reduction of the bag limit to one buck, with perhaps total protection for mule deer, seems reasonable in view of proper conservation, but the demand for a much later and shortened season is one that has a direct bearing on the widely different conditions existant in the state and on the logical time for the securing of deer to be used for food.

The most necessary thing is that the deer season be consistent from the standpoint of deer conservation, with a second look toward the matter of fire prevention, for it appears to us that the hunter is but one of the many factors which contribute to fire loss.

The Forest Service is to be commended for its untiring efforts to lessen the loss due to forest fires and the hunters and fishermen of the state will be ready to accede to any reasonable measures to prevent forest fires. The question to be decided by the legislature is whether the advocated late and shorter open season on deer is consistent with the principles of game conservation, and whether the open season requested is the best means of attaining the results sought by the Forest Service.

NEW EDUCATIONAL FILMS.

The educational department of the Commission announces a new film entitled "The Salmon, King of Fishes." This film actually shows salmon spawning in the Klamath River and details the salmon-cultural work of the Commission. Scenes show the seining of salmon, spawning operations, shipment of eggs, etc.

Other new motion pictures include ducks and geese on their loafing grounds near Marysville Buttes. Some wonderful pictures showing the large numbers of waterfowl which still winter within the great valleys of California were recently taken.

These films may be obtained by schools, fish and game protective associations and other organizations.

The following announcement from the Weekly News Letter of the State Department of Agriculture for October 7, 1922, should be of general interest and should make certain individuals "prick up their ears."

Predatory Animal Force Renders Service in Lassen.

"During the month of August six traps, belonging to the Government and used by Hunter Frank W. Koehler in State-County-Federal cooperative work in Lassen County, were stolen. A Basque sheep herder, the guilty party, was seen taking the traps by Hunter Koehler. The matter was reported to Inspector Poole, of the cooperative predatory animal control service, conducted by the California Department of Agriculture and the U. S. Department of Agriculture, who made a trip to Ravendale to investigate and take such action as appeared to be logical. A complaint was sworn to and the man arrested, tried and convicted under the state law applying to such cases. A sentence of $100 fine and six months in jail was imposed by Judge M. R. Arnold of Susanville, together with a strong talk along the lines of refraining from such acts, since the various agencies are endeavoring to assist the stockmen in diminishing their losses of stock by eradicating the coyote. He stated that overt acts such as this not only retards the work of the men employed as hunters but is a menace to the general welfare of the community.

"It is believed that this will have a salutary effect and will be an object lesson that will prevent the theft of traps and animals such as have occurred in the past."—Joseph Dixon, Berkeley, Cal.

FIG. 13. Geese near Pennington, Sutter County, November 17, 1922. Geese are still numerous in some parts of California. Photograph by H. C. Bryant.

FINE OF $100 AND SIX MONTHS IN JAIL FOR STEALING TRAPS.

Section 13 of the Fur Trapping Regulations of the California Fish and Game Laws states: "Every person who shall disturb or remove the traps of any licensed trapper while trapping on the public domain or on lands where he has permission to trap is guilty of a misdemeanor." In spite of this warning the reports of California trappers show that many traps are stolen annually. In some instances only the animal in the trap is taken, while in other cases both the animal and the trap are stolen. The following experiences are typical. Mr. John N. Beck of Napa, reports a catch of 90 coyotes during the season of 1921-22. During that trapping season he had 30 traps stolen. In 1920, the writer found that certain woodchoppers were regularly stealing coyotes from the traps of Arthur Oliver near Firebaugh.

WHALES DISAPPEARING ALONG CALIFORNIA COAST.

A bulletin just issued by the State Fish and Game Commission entitled "A History of California Shore Whaling," by Professor Edwin C. Starks of Stanford University, calls attention to the past and present status of shore whaling along the coast of California and points out the rapid disappearance of the mammals responsible for a valuable industry. Early accounts show that whales were extremely numerous in the early seventies but by 1874 extensive whaling operations had reduced them to the point where shore whaling was much less profitable. At one time seventeen whaling stations were to be found along the coast. Fifteen to twenty years ago whaling was not considered profitable anywhere along the coast of California, but more recently two whaling stations have been established and profitably run.

The bulletin, which is well illustrated, furnishes an interesting outline of the history of whaling along the California Coast and describes each of the species of whales inhabiting California waters. The California gray whale, once most abundant of all, has now almost entirely disappeared. The humpback is the only whale that can still be called common, but it is not nearly so abundant as it was formerly.

Interesting pictures show flutings on the under surface of a humpback whale covered with goose-neck barnacles, which are found in patches on various parts. Apparently, living animals, therefore, are infested as are the bottoms of ships, but not with the same kind of barnacles.

The conservation of whales is very important at this time, and to be adequate must be international in character. At present, no protection whatever is afforded the largest of sea mammals and females are often killed while nursing young.

The bulletin, which is the sixth of the series of fish bulletins, may be obtained on application to the Fish and Game Commission.

MANY WHALES COMMERCIALLY EXTINCT.

According to figures given by Dr. B. W. Evermann in The Scientific Monthly. (Vol. 15, p. 310), the total number of whales taken by the Moss Landing Whaling Station of California from January 16, 1919, to May 3, 1922, was 832. "Seven different species were represented, as follows: Bottlenose, 1; sei, 1; California gray, 1; sperm, 5; sulphur-bottom, 5; finback, 33; and humpback, 781.

"These figures are of value in that they show the species of whales that now occur on the coast of California and the relative abundance of the different species. It is seen that only one—the humpback—is at all common. The scarcity of the others is significant; indeed, all but the humpback are already commercially extinct. Only the humpback remains in sufficient abundance to justify the establishment of a whale fishery on this coast.

"In 1853 Captain Scammon estimated that fully 30,000 California gray whales visited the California coast annually. The small catch of that species shows clearly that it has been almost wholly exterminated on the California coast. It is evident that the humpback whale also will soon be as seriously depleted unless effective measures be taken soon for its protection."

FURTHER TESTS IN USE OF GALVANIZED VESSELS IN SHIPPING FISHES.

In connection with the transportation of living fishes in galvanized iron vessels, further experiments along this line have been conducted, the results in each case tending further to prove that galvanizing is not harmful to fish. The recent experiments involve such fish as rainbow trout, brook trout, lake trout, and whitefish fry and fingerlings. Fish were in transit from periods ranging from 6½ to 35½ hours without change of water, and in each case they arrived at destination in good condition.—Service Bull., U. S. Bur. of Fisheries, No. 88, p. 5.

FOREST FIRES AFFECT FISH LIFE.

So obvious is the serious loss of valuable timber occasioned by the fires which annually devastate our forests, even those who are poorly informed are well aware of this condition. Less apparent but no less real is the loss, from the same cause, of other natural resources. The wild life of the woods and streams must suffer. Particularly through the food and game fishes is there a serious loss. Too little attention has been paid to this subject and consequently we have little reliable information. A few of the most immediate effects detrimental to fish life, following forest fires, are a quick rise in the temperature of the water, a lowering of the oxygen content, a change in the chemical properties, a destruction of shade. Most forest streams are slightly acid—a condition known to be well

adapted to trout; the deposit of ash in the stream gives it an alkaline quality, most destructive to fish life. This deposit of ash also probably has an injurious mechanical effect on the fish, in addition to that incurred by the chemical change. These immediate and more easily recognizable effects of the fires do not cover all the loss that may be expected. More far-reaching is the destruction of food, increased turbidity of the water and the decreased protection from floods and droughts.—Service Bull., U. S. Bur. of Fisheries, No. 88, p. 2.

THE WILD PHEASANTS OF CENTRAL CALIFORNIA.

Several years ago there were ten pair of Chinese pheasants liberated close to Antioch. The ten pair soon scattered and the next season they were in different parts of central California. In 1921 I was at Isleton, a small town on the Sacramento River. I was out every day of the season after quail and cottontails. Early in the morning I have seen as many as fifty and sixty pheasants in a flock. They would, as a rule, be seen in the corn fields in the mornings and in the asparagus fields or the brush in the afternoons and evenings. As a rule, the hunters abide by the game laws around there, but I have seen boys around seventeen or eighteen years of age come to town with a barley sack as full of pheasants as they could get it and some in their coats. They would sell them to the Chinamen and restaurants about the towns of Isleton, Rio Vista, Ryde, Walnut Grove, Locke and Courtland.—Chas. Follett, Merced, California.

MULE DEER NEED FURTHER PROTECTION.

Big Game Refuge (District One B) is insufficient to maintain a breeding stock of mule deer, since there is not sufficient water during the hunting season. The southwestern portion thereof is entirely without water for deer. The deer leave this refuge to find water and the hunters have learned to wait on the runways and trails and wholesale slaughter results.

The mule deer is the largest and finest game animal in the State of California and it should have all the protection possible. Additional areas are needed to supply sufficient water in the present refuge, and additional areas must be set aside as refuges. The construction of roads for automobiles makes it possible for the hunter to reach every nook and corner of the deer range and only the strictest laws will make it possible for the mule deer to continue to exist. While this season a great many good specimens of this species were bagged, the writer can verify the fact that the mule deer are at present greatly on the decrease; it is very common to see does without fawn. There is also a certain area known as the Lava Beds consisting of approximately one and a half townships, which is considered by sportsmen a slaughter pen for mule deer. The most inexperienced hunter has been able to bag a limit on this area. On the opening day of the season of 1920, the writer estimated 160 hunters were bombarding the animals. From his own observation, he estimates 100 mule deer were killed in the Lava Beds during the winter of 1921-22. During this winter, coyotes took a large toll of mule deer. The writer has in evidence a wonderful large buck head, which he found with blood flowing from the carcass of the animal, and four large coyotes taking a meal of warm flesh. Two of the coyotes were there shot by the warden. Then the warden called upon the United States Department for assistance in exterminating the coyotes. Mr. Chas. G. Poole, in charge, placed two hunters and trappers in the lava beds, who succeeded in destroying the pests at the rate of approximately fifty coyotes per month. Up to this writing, approximately two hundred coyotes and wild cats have been destroyed. By this assistance, the Biological Survey will save hundreds of deer for the state.

The sage hen is almost extinct in Modoc County. This last season very few hunters were able to bag a limit of the defenseless birds. In the first place, a great mistake was made when August 1 was set for the opening date of sage hen season. This season there were very few young birds. Those found on the first of the open season were only about one-third grown. Even with better laws, it will take years to reinstate the sage hen to its former condition.—Geo. W. Courtright, Straw, California.

OREGON SPORTSMEN PROTEST.

Sportsmen living in the Klamath Falls district in Oregon complain that they are unable to utilize deer killed within the State of California. This district is unfortunate in that politically it is a part of Oregon but geographically a part of California. The securing of a nonresident license to hunt in California does not make it possible for them to carry their kill back into the state of Oregon. As a consequence, these Ore-

gon hunters must eat up their venison while in the State of California and can not even take back the trophy until it is properly mounted. Some adjustment will doubtless be worked out to cover this situation.

ROOSEVELT WILD LIFE STATION.

Several years ago the Roosevelt Wild Life Experiment Station was established at the New York State College of Forestry "to commemorate the achievements in wild life and forest conservation of New York State's most distinguished citizen and hunter naturalist." This station's staff, headed by C. C. Adams, includes several well-known scientists who are devoting their time to research related to forest wild life. It is the endeavor of the station, through field and laboratory study, to develop new or improved methods of increasing the forest production of fish, fur and game animals and to show their application to general forest management. Among the completed projects is a biological survey of Palisades Interstate Park.

In the summer of 1921, a survey of beaver in northern Herkimer and Hamilton counties, New York, was undertaken, and in the summer of 1922 the beaver in Yellowstone National Park were studied. Roosevelt Wild Life Bulletin (Vol. 1, No. 2) contains the published results of these investigations under the authorship of Dr. Chas. E. Johnson and Mr. Edward R. Warren, respectively. The papers are well illustrated and both emphasize life history and habits. Considering the time the authors spent in the field, the results give promise of further splendid contributions to knowledge concerning the life and habits of this most noted of fur bearers.

There is a dearth of fundamental knowledge of the life history and habits of fish and of game and such an institution as the Roosevelt Wild Life Experiment Station has unlimited opportunity to supply this need. It is to be hoped that institutions of this kind will spring up in every state, so that sound knowledge may replace guess work and the results of scientific research come to form the basis of protective legislation.

SANTA BARBARA TO FRAME PROTECTIVE LAWS.

The city park commissioners of Santa Barbara are making a progressive and commendable move in the direction of a city ordinance which will make of all their city parks wild life refuges. For several years a pond in one of the city parks near the shore has been designated by the commissioners as a refuge for water birds. Owing to the general prohibition of the use of firearms within the city limits, the ducks which flock there have learned to feel themselves so safe that poachers now find it an easy matter to approach them near enough to throw clubs and stones with stunning or fatal effects. There seems to be no statute, city, state, or federal, which makes this a legal offense during the open season on waterfowl.

Not only does the protection of wild fowl add to the delights of these parks, but Oakland has gained fame for Lake Merritt as a refuge for ducks and other water birds, and for the annual duck pageant held there. Waterfowl at Golden Gate Park, San Francisco, are also a great attraction. The establishment of such refuges in the heart of a city affords pleasure to the numerous park visitors, has great educational value, fosters the love and appreciation of birds, and ultimately serves the interests of true sportsmen.

FOX FARM TO BE ESTABLISHED NEAR SAN BERNARDINO.

California is to have another fox farm. Mr. Jacob Host, who represents the Bear Lake-Silver-Black Fox Ranch Company, owners of two established fox farms in the middle west, is in charge of the new enterprise. He has been granted a permit by the United States Forest Service to occupy twenty-two acres of land in the Cajon Pass just north of San Bernardino. Here the company contemplates the installation of an ice plant to preserve the food, the keeping of goats for milk, and the raising of poultry for feed.

The Bear Lake-Silver-Black Fox Ranch Company expect to ship thirty pair of foxes to the new California farm.

GAME LAW CHANGES IN OTHER STATES.

Interesting recent modifications of state game laws are as follows:

New Jersey requires persons hunting woodcock from October 1 to November 9, to take out a special license costing $2, in addition to the regular hunting license. Chinese and ring-necked pheasants are now protected throughout the year for an indefinite period in Maryland, where an attempt is being made to establish the species. Virginia prohibits the baiting of wild turkeys or the taking of their eggs except for propagating purposes under permit from the commissioner. The closed season for quail in Massachu-

setts has been continued until 1925 in Dukes, Essex, Hampden, Middlesex and Nantucket counties.

The open season for big game has been reduced in several instances. A law was passed in Virginia sanctioning the practice of the department of game and inland fisheries of establishing game refuges on private lands by contract with the owners. All lands so set aside are required to be conspicuously posted as state game sanctuaries.

A summary of the provisions of Federal, State and Provincial Statutes, and a list of officials from whom copies of state game laws may be obtained, is contained in Farmers' Bulletin 1288, Game Laws for 1922, by George A. Lawyer, chief United States game warden, and Frank L. Earnshaw. The bulletin is available free upon application to the United States Department of Agriculture, Washington, D. C.

Regulations pertaining to the propagation and sale of migratory waterfowl and game are given. The text of the Lacey and Migratory Bird Treaty Acts and regulations pertaining to this country and also in Canada are included.

MOURNING DOVE A MIGRATORY BIRD, COURT DECIDES.

The mourning dove, known in some localities as the Carolina or turtle dove, is a migratory bird coming within the protection afforded by the Migratory Bird Treaty and the Act of Congress to give it effect, although individuals of the species remain within the borders of certain states the entire year. This decision was rendered in the case of the United States against Joseph H. Lumpkin, brought to trial at Athens, Ga., November 14, before Federal Judge S. H. Sibley and a jury.

The defendant, who was charged with killing mourning doves during the federal closed season, contended that the birds which he had killed had not migrated but had remained in Georgia the entire year, and for this reason were not covered by the federal statute. The case, which attracted widespread attention, was attended by prominent attorneys of Georgia.

The court held as a matter of law that the mourning dove is proteced by the Migratory Bird Treaty Act and Regulations, and instructed the jury that the only question of fact to be decided by it was whether the defendant actually killed mourning doves in the closed season as charged in the indictment. The trial consumed two days and resulted in the jury returning a verdict of guilty, and the imposition of a fine of $25 and costs.

BEAVER FARMING PROMISING IF PROPERLY CONTROLLED.

Beavers are of importance as fur-bearers and conservators of water and soil. Their unique habits make them animals of general interest. In certain types of forest country, or farms, in irrigation ditches, and along trails, roads, and railroads, they are capable of doing serious damage. It becomes necessary in such cases to remove them or to control them intelligently.

Their control, however, is not difficult. United States Department of Agriculture Bulletin 1078, Beaver Habits, Beaver Control, and Possibilities in Beaver Farmign, by Vernon Bailey, of the Bureau of Biological Survey, discusses in detail the kinds of traps, fences, and other control measures which have proved satisfactory. The bulletin also points out that beaver farming may prove a successful branch of fur farming if carried on in suitable localities. Beavers in our national forests if properly controlled, would conserve water and soil, weed out timber of little value, and yield good returns in fur. In connection with projects for reforestation with conifers on well-located, burned and cut- over timber lands, beaver culture might prove profitable. These lands are frequently covered with a second growth of aspen, willow, and pin cherry, which are ideal food for beavers, while having little commercial value.

Aspens and willows are abundant also in the certain northern areas of Canada and Alaska, where beavers were formerly very numerous. In such areas experiments might be made to determine the practical possibilities in beaver farming.

Only two centuries ago beavers inhabited the greater part of the North American Continent and were an important source of food and warm clothing to the native people. Traffic in their skins promoted early settlement of the country. They have been exterminated over much of their area by intensive trapping, but for the last 20 years they have been given special protection in many sections of the country and under favorable conditions have thrived and increased rapidly.

While it would be obviously unwise to restore the animals to cultivated fields and orchards in agricultural areas, there are still many localities where they could be introduced without harm. By storing water in the reservoirs along mountain streams they would help prevent floods and extensive erosion and would increase stream flow in dry weather.

Beavers with the darkest, most beautiful, and most valuable fur are found along the southern shore of Lake Superior, in Wisconsin and Michigan. In other locali-

ties the fur is paler and less desirable. In making suggestions relative to raising beaver for fur, the importance of using the best types of animals for breeding stock is emphasized.

Department Bulletin 1078 describes in considerable detail the interesting life and habits of beavers, which rarely dig on the surface of the ground and never make a burrow with an exposed entrance. In carrying materials they use their strong incisor teeth for transporting logs or large pieces of wood, and for mud and small sticks and twigs from the bottom of the pond to be placed on the dam or house, they use their forelegs as hands and arms. The flat heavy tail is a rudder or propeller in the water and a prop or brace on land.

Beavers occasionally damage choice trees but the most serious damage is occasioned by their dams, which raise the water levels in streams, ponds, or lakes, flooding low ground and frequently killing great areas of valuable forest trees. When railroad grades are flooded in low ground the result may be serious. A suggestion is made in the bulletin for using an outlet pipe to keep beaver ponds at a desired level as one means of preventing heavy damage. One of the simplest and most important means of beaver control is fencing. Many of the woven-wire stock-fences are satisfactory. Full directions for trapping with various types of traps are given in the bulletin. Light-furred pelts bring from $6 to $8 each, heavy dark-brown skins from Canada and Alaska bring from $20 to $25 each, and the rare "black beavers" from the south shore of Lake Superior from $38 to $50.

LIFE SENTENCE FOR MURDER OF FEDERAL GAME WARDEN.

For the murder of Edgar Lindgren, United States game warden in charge of the Iowa district, the maximum penalty, life imprisonment, was imposed upon Louis Esposito, who was convicted by a jury October 11. Warden Lindgren was shot and fatally wounded while discharging his duties near Big Lake, Iowa. While patrolling he encountered three Italians hunting in violation of the federal laws. Lindgren attempted to arrest them, and one of the three fired at him, almost blowing off his right hand. When the warden turned to get under cover he was shot twice in the back and once in the side. Esposito's brother, Sebastiano, is facing trial on the same charge. The third man is not charged with actually shooting at Lindgren.

MIGRATORY BIRD LAW ENFORCEMENT.

According to the last report of the Chief of the Bureau of Biological Survey, from 25 to 28 regular salaried wardens were employed in the enforcement of the Migratory Bird Treaty Act. These were aided by 48 United States deputy game wardens, receiving a salary when employed during short intervals in emergencies, and by approximately 350 United States deputy game wardens stationed at suitable points throughout the country, who receive a nominal salary of $1 per annum and cooperate by reporting violations, thus bringing about better observance of the law.

During the fiscal year 194 convictions were obtained out of 772 cases pending. California is credited with but two of the convictions obtained in federal courts.

TOADS OF SOME USE IN CURBING CERTAIN PESTS.

Toads have been reputed to aid in curbing the numbers of injurious insects and other similar pests. To ascertain the facts in the case the Biological Survey of the United States Department of Agriculture has analyzed the contents of the stomachs of 502 common toads, and reports that while the findings regarding the choice of food are of interest they thus far fail to demonstrate that toads are of great economic importance. Toads go constantly about their own work of gaining a livelihood, and so undoubtedly fill their proper place in nature. They are never very numerous in one locality, however, and as they can not adopt the methods of birds and traverse wide stretches of land to aid in combating abnormal local increases of crop and garden pests their influence is not strongly felt. The investigation shows that a certain portion of the toad's food is made up of injurious insects and other pests of growing plants, and that the toad performs some service in such places as greenhouses, gardens, fields of small grain, and golf courses. Any harm that toads do in the consumption of beneficial beetles and other insects useful to man is of little economic importance and does not warrant their indiscriminate destruction.

THE BODY TEMPERATURE OF BIRDS.

Every student of zoology is taught that certain vertebrates have a body temperature below the temperature of the human, and hence are called cold-blooded ani-

mals, whereas others of a body temperature about the same or greater than that of the human, are called warm-blooded animals. It is not often, however, that an explanation is given of the underlying cause for this difference in temperature.

A study of the body temperature of birds, by Alexander Wetmore, published in the Smithsonian Miscellaneous Collections (Vol. 72, No. 12, pp. 1-52), explains a certain diurnal variation in the temperature on the basis of the metabolism of the individual as reflected by its activities. With birds there is no constant relation between the normal temperature of the surrounding medium and the body cavity such as we find in cold-blooded animals.

Body heat in all animals is caused by tissue changes during active work performed by various organs or parts. In the group that we class as warm-blooded, these changes are more rapid and intense, so that heat generation may be in excess of heat radiation. There is a more perfect control of heat radiation in the warm-blooded group.

Of particular interest is the evidence presented to show that the air sacs which are found within the bones of birds have a relation to body temperature. With animals as active as are birds, means of relief for over-heating must be well organized; the extension of the air sacs through the body cavity is excellent for this purpose.

The rare occurrence of frozen feet among birds is not, as yet, possible of explanation.

"It may be assumed as certain that heat production and local control are under nervous direction and that these two functions are directly concerned in whatever mechanism has developed for temperature control.

"It seems probable that in our living fishes there is little actual temperature control. In Amphibia [toads, frogs and salamanders] this regulation is developed to some extent and it has progressed somewhat farther in modern reptiles. In the bird, however, the regulation of body temperature has reached its highest point, though birds stand second to mammals from an evolutionary standpoint. Proof of this is found in the fact that birds have the highest body temperature known, and that none of them hibernate (in spite of ancient belief to the contrary)."

When ranged by families, the highest temperatures noted are to be found in pigeons, cuckoos, woodpeckers and in the perching birds, beginning with the flycatchers and ending with the thrushes. The swallows as a group, possess the lowest average body temperature, only the rough-winged swallow showing an average body heat above 107.5 degrees. On the other extreme, in the family of flycatchers, there are five species in which the mean temperature for male or female is 110 degrees, or more, and seven other species of birds hold the same record. The highest average temperature for both sexes is that of the western wood peewee with a mean of 110.2 degrees. The highest single reading believed to be valid was found in this species when the temperature was taken of a bird killed in the Graham Mountains of Arizona, which registered 112.7 degrees.

Although independent of external temperature, the temperature of a bird appears to advance a few degrees as the day advances. With the exception of the phalarope, the avocet, and certain other shore birds, where the male performs the duties of incubation, the body temperature of the female is slightly higher than that of the male.

Full summary of records of the body temperature of 327 species of birds are appended, together with a supplementary table of temperatures taken from available literature which adds temperatures for 92 species. The short bibliography shows that little has been written along this line heretofore.—H. C. Bryant.

FACTS OF CURRENT INTEREST.

The open season on waterfowl has proved a splendid one for the hunter. Ducks and geese have been plentiful.

Fall spawntaking operations on the Klamath closed on November 15th, after a most successful season. At Klamathon 20,000,000 salmon eggs were secured.

A wonderful concentration of ducks and geese in the Butte Creek district west of Marysville Butte has been evident this fall. Birds seemed to be numbered in the millions.

Several salmon, marked four years ago and liberated in the Klamath River, were taken this year during spawning operations.

During the past biennium confiscations of illegally taken fish and game amounted to over two tons of venison, 4,500 ducks, 25 tons of fish and 12 tons of lobsters and shellfish.

Brood trout at the Mount Shasta Hatchery will this year furnish 10,000,000 eggs. The pond system is responsible for a dependable supply of eggs.

The imports of fresh fish from Mexico in 1921 amounted to 6,699,817 pounds, as compared with 8,121,225 pounds the previous year. The principal species imported were barracuda, 3,036,262 pounds; flounders, 1,314,918 pounds; spiny lobster, 943,547 pounds, and white sea bass, 500,075 pounds.

Results of salmon marking experiments have shown that salmon from the Sacramento River migrate at least as far north as Shelter Cove, and that salmon from the Klamath River contribute to the catch at Monterey Bay.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JULY, AUGUST AND SEPTEMBER, 1922.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Colusa, Tehama, Glenn, Butte	Sacramento, San Joaquin	Contra Costa, Alameda	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California
Albacore										41		10,686,557	16,073	1,414,653	12,117,324	
Anchovies								85,150		2,150		798			88,098	
Barracuda								81	22	2,415	42,189	635,267	373	152,052	832,399	203,988
Bluefish									1,560	14,308					15,868	
Boccaccio			22					6,454	27,382	106,839					140,697	
Bonito									13,500		9,077	733,656	60	15,508	771,801	1,080
Carp				265		549	10,219	2,360							13,393	
Catfish		2,652				787	42								3,481	
Chilipepper									13,982	2,556					16,538	
Cultus Cod	6,835	1,968	44					144,987	16,297	15,581					185,712	
Dolphin																
Eels														20	20	
Flounders	210						154	93,467	85	103		437			94,456	
Grayfish							860	10,153						21,055	32,068	
Greenfish																
Hake								24,059	600						24,659	
Halibut	29,563	34,660	143					31,596	555	14,962	83,788	210,162	599	25,813	431,841	550,435
Hardhead																
Herring																
Kingfish								896	5,818	22,155		11,928		1,624	42,421	70
Mackerel									9,989	228,239	14,136	272,150	5,671	15,205	545,390	7,838
Marlin																
Mullet														2,563	2,563	
Perch	13,068							13,823	13	2,196	24	9,039	209	2,483	40,855	145
Pike						34	461	90							585	
Pompano								252	7			3,752			4,011	
Rock bass											735	86,252	1,349	79,805	168,141	1,424
Rockfish	9,377	1,054						172,952	65,632	114,748	4,116	86,168	2,841	34,850	491,738	1,430
Sablefish								41,482	417	2,382					44,281	
Salmon	1,668,901	779,937	6,366	245,162		174,412	476,669	556,312	15,668	5,542	30				3,928,999	
Sand Dabs								212,250	6,050	726		2,358	121		221,505	
Sardines								88,340	1,800	15,689,556		8,551		175,415	15,963,662	
Sculpin												669		630	1,299	
Sea Bass—Black											352	13,086		11,251	24,689	1,680
Sea Bass—White			14,195					20,059	41,976	494	32,757	691,498	13,087	52,967	867,033	375,857
Sea Trout								25				180	221	3,312	3,738	
Shad				28			12,588	98							12,714	
Shad—Buck							1,014								1,014	
Shad—Roe				35			3								38	

Sheepshead												25	59		124	208	
Skates								11,418	150							11,568	
Skipjack									11,136				3,473,124		4,733,629	8,217,889	224
Smelt	5,488		6,215					10,393	80,883	22,141	24,616	23,118	15,963	3,549	192,366	1,946	
Sole	130							1,889,167	4,081	26,110	2,007	3,435	85		1,925,015		
Splittail							1,018								1,018		
Striped Bass			67	4,356		703	69,111	64,928							139,165		
Stingaree																	
Suckers																	
Surf Fish																	
Swordfish												20,390		1,245	21,635		
Tomcod								17,542	265						17,807		
Trout—Farm																	
Trout—Steelhead	2,345														2,345		
Tuna											2,065	596,437			598,502		
Tuna—Bluefin												1,644,278		773,192	2,417,470		
Tuna—Yellowfin												507,960		422,337	930,297	832,033	
Turbot								625							625		
Whitebait	12,473							18,313							30,786		
Whitefish												2,333			2,333		
Yellowtail											14,316	572,514	444	718,980	1,306,254	20,253	
Miscellaneous	286						10	5,429	1,936	924	1,911	21,188	736	290	32,710	400	
Total fish	1,748,676	820,271	27,052	249,846		176,485	572,149	3,522,701	319,804	16,274,168	232,144	20,317,344	57,832	8,662,552	51,981,024	1,998,803	
Crustaceans:																	
Crabs (doz.)	472		364					25	17						878		
Eerevisse (doz.)																	
Shrimps			28,558				33,755	187,158							249,471		
Spiny lobsters																	
Mollusks:																	
Abalones										656,721	3,595				660,316		
Clams—Cockle	999	124	3,881												5,004		
Clams—Mixed	1,326		1,554				385								3,265		
Clams—Pismo									337		61,202				61,539		
Clams—Softshell	321	481	20,400				54,216	13,188							88,606		
Cuttlefish								1,790	17	12,741					14,548		
Limpets																	
Mussels							319	1,284		1,290	54		15,197		18,144		
Oysters—Eastern (No.)			606,801												606,801		
Oysters—Native																	
Snails																	
Squid										115		15			130		
Miscellaneous:																	
Frogs (doz.)																	
Terrapin (doz.)					5										5		
Turtles																135	

All amounts shown in pounds unless otherwise specified.

NOTES FROM THE STATE FISHERIES LABORATORY.

WILL F. THOMPSON, Editor.

THE LABORATORY STAFF.

Dr. Tage Skogsberg has accepted a position as research assistant to Dr. Kofoid of the University of California. Dr. Skogsberg has been engaged in writing a report upon the purse seine fisheries of Southern California, and plans to finish that in December, when he will leave to take up his new work. The laboratory members have enjoyed their association with Dr. Skogsberg and wish him good fortune in the change.

Mr. O. E. Sette, who has been at the laboratory since his graduation from Stanford University last June, leaves October 1 for Monterey. He is to work with Mr. W. L. Scofield there upon the preparation of a sardine report.

Miss Frances N. Clark, librarian and scientific assistant, has left on a leave of absence to undertake further work at Stanford University during the fall quarter. She is to return in January, 1923, and her place will be filled temporarily.

THE ALBACORE RUN.

The run of albacore has this year proved disappointing, the season being relatively light and closing early. Some apprehension as to the condition of the fishery would seem necessary, since the lack of fish seems accompanied by a lack of older year classes. No definite statement as to the reality of this can be made, however, until the completion of the present work upon the life history of the albacore. It is unfortunate that it has not been posible to follow the complete course of the season's run because of the diversion of the assistants to other work.

THE LIBRARY.

Due to lack of funds, no extensive additions have been made to the library during the past three months. As the library is vital to the prosecution of scientific work, it is hoped that this condition will soon pass.

DEPLETION OR FLUCTUATION.

There is at present in progress a very animated discussion in British fishery circles as to the relative importance of natural fluctuations in abundance and over-fishing, as witness a recent meeting of the British Association for the Advancement of Science, addressed by a prominent member of the trade. The lack of accurate data on catches made in past years seems to have provided room for very divergent views, and the failure of the enforced closed season of the war period to lead to a rapid recovery seems to have inspired various men to criticize the evidence for over-fishing. They demand, instead, an intensive study of the great natural fluctuations which occur.

That such a study is of the greatest importance can not be doubted, as at present it is not even known what fisheries are subject to great changes in abundance. It is commonly accepted that the cod and herring are such fisheries, but the knowledge of the subject as regards the majority of the species seems scant. It is worthy of note that this question as to the existence of great fluctuations is of the utmost importance to the Pacific Coast fisheries, such as albacore, and that the State Fisheries Laboratory has for one of its principal objects the detection of such fluctuations and a study of their causes. Every effort is being made, for instance, to follow dominant year classes in the sardine fishery.

The discussion as to the presence or absence of depletion from over-fishing in the North Sea has brought home in a vivid way the lack of accurate statistics there, and the trade itself is urging with considerable vehemence the institution of a competent statistical system. In view of the emphasis which has come to be placed upon the need for such, it is obvious that the government in California should spare no effort to maintain and improve the present statistical system.

In so far as over-fishing is concerned, critics have pointed out that there was not a rapid recoverey in abundance of all fish in the North Sea after the war with its enforced closure of grounds, and have assumed that the lack of such a recovery proved the absence of over-fishing. It would seem to us, however, that such a conclusion is unjustified, and we will await with some interest the more careful summation of the evidence which we feel sure must follow the initial discussions. The conclusion seemingly involves the assumption that the reproductive power of the species is unhampered, and that there are no obstacles to recovery of lost ground. But depleted species must depend upon a lessened number of spawners, and it must make its way again into grounds occupied by other species of animals who have made good use of their opportunities in the past. A species of

fish, unhampered by man, is granted to have a natural limit of increase, but surely the conclusion has not been justified that the limiting influences operate only after a certain abundance is reached. It would, indeed, seem that no conclusion can be drawn from a single year's observation, and that a question as to the fundamental character of the existence of a species is raised. The evidence of future catches, and the more mature conclusions of North Sea naturalists will assuredly be of the greatest interest.

CONSERVATION IN OTHER STATES.

OPEN SEASON ON ELK DEMANDED IN WASHINGTON.

Certain hunters in Washington are drafting a bill to present to the Washington legislature which provides for an open season on elk previous to 1925, the time now set for the opening of the season. They contend that there are too many bull elks. Licenses issued are to be limited to bulls only.

It seems doubtful whether the herds of elk still remaining in the northwest can withstand an open season and many are demanding that a distribution to other parts of the state be made of animals taken from the present herd rather than a toll to be taken by the hunter.

SOUTHWESTERN ALASKA FISHERIES RESERVATION.

On November 3 the President signed an executive order establishing a government fisheries reservation, including Bristol Bay, Kodiak and Afognak waters, and Cook Inlet, in southwestern Alaska. The text of the order is as follows:

EXECUTIVE ORDER.

Whereas it has become apparent that certain valuable fisheries of Alaska have been seriously impaired and are in danger of further depletion, and that it is necessary to establish authority to meet the exigency which has arisen for the protection of these fisheries, and

Whereas by Executive order issued under date of March 3, 1913, modified by an order of August 11, 1916, a reservation known as the Aleutian Islands Reservation was created, and by an Executive order under date of February 17, 1922, a reservation known as the Alaska Peninsula Fisheries Reservation was created, including therein the lands and the territorial waters of the United States contiguous to the lands covered by said executive orders:

Now, therefore, I, Warren G. Harding, President of the United States of America, by virtue of the power in me vested by the laws of the United States, do hereby set apart as a preserve to more effectively insure the protection of the fisheries and for their encouragement and development, in addition to the above reservations, a reserve of lands and waters, which said reservation shall be known as the Southwestern Alaska Fisheries Reservation, which shall include all territorial waters, and the lands within one-half mile of the shores thereof, within the lines defined as follows:

From the northeasterly point of the Alaska Peninsula Fisheries Reservation at Cape Menshikof, Bristol Bay, northwesterly to a point in latitude 58° 32' north, longitude 162° 12' west, off Cape Newenham; thence to a point in latitude 59° 15' north, longitude 162° 0' west; thence eastward along parallel of latitude 59° 15' north, to longitude 155° west; thence to a point in latitude 61° 20' north, longitude 151° 20' west; thence to a point in latitude 61° 20' north, longitude 150° 10' west; thence to a point in latitude 61° 35' north, longitude 149° 40' west; thence to a point in latitude 61° 35' north, longitude 149° 0' west; thence to a point in latitude 60° 40' north, longitude 149° 0' west; thence to a point in latitude 60° 40' north, longitude 151° 0' west; thence to a point in latitude 57° 30' north, longitude 151° west; thence to a point in latitude 55° 0' north, longitude 157° 0' west; thence to low-water mark at the eastern extremity of Foggy Cape on Sutwik Island; thence to point of beginning.

Fishery operations within the said Southwestern Alaska Fisheries Reservation shall be subject to such regulations and restrictions as shall be issued by the Secretary of Commerce, in addition to the general fisheries laws and regulations of the United States as administered by the Secretary of Commerce.

The reservation hereby established shall not interfere with the use of the waters, islands or other lands embraced therein for any purpose not inconsistent therewith, nor with the operation therein of the laws now or hereafter applicable to the public lands in Alaska, nor with the respective jurisdictions of the Secretary of Agriculture and the Secretary of the Interior thereover.

Warning is hereby expressly given to all unauthorized persons not to fish in or use any of the waters herein described or mentioned.

WARREN G. HARDING.

The White House, November 3, 1922.

OREGON INTRODUCES MOOSE.

Recently several moose, the only ones in Oregon, were liberated in western central Oregon, in Douglas County on Lytle Creek, a tributary to Lake Tehkeniche. The moose were planted within two miles

of the ocean, along a low range of foothills while the shore of the lake has many miles of marsh land which is said to be well adapted for them. Oregon has a number of large game refuges, but none of them contain suitable marsh land for moose.

The Game Commission ordered six calf moose, three males and three females. After arriving at Portland, one of the males died. The animals weighed about 250 pounds each, and were very tame. To give them every opportunity to become established, a man will keep a watch on them. This attempt to add another species of big game to the state is being watched with great interest by the sportsmen of Oregon.—OVERTON DOWELL, JR., Mercer, Oregon.

WEST VIRGINIA ORGANIZES WILD LIFE LEAGUE.

A Wild Life League, designed to stimulate the conservation of natural resources, has been established in West Virginia, and Mr. Howard H. Cleaves, formerly director of the Natural History Museum of San Diego, has been placed in charge. Branch leagues are being formed in all of the fifty-five counties of the state. A state convention, composed of delegates from all the various branches will meet annually. An illustrated monthly publication devoted to the interests of the out-of-doors in West Virginia is contemplated.

NEBRASKA ENUMERATES EXTINCT GAME.

A bulletin of the Nebraska Conservation and Soil Survey (No. 12) by R. H. Wolcott, entitled "Nebraska's game resources and their conservation," records eight species of big game mammals extinct, impounded or protected throughout the year. The number of game birds now extinct, or practically extinct, number twelve.

LARGE TAKE OF TROUT EGGS OBTAINED IN FISH LAKE, UTAH.

The Utah State Game Department and the Bureau of Fisheries obtained 6,000,000 eastern brook eggs from Fish Lake on the Fish Lake Forest, Utah, in 1921. This is double the amount taken any other season and eggs were still available when the work closed. The increase in the amount of spawn of the eastern brook trout obtainable is credited by the Bureau of Fisheries to the consistent planting of three and four inch fish which has been done by the bureau since 1917, the total number planted by them being 141,000. Last spring nearly 10,000,000 eggs of rainbow trout were obtained from Fish Lake, making a total of at least 15,000,000 eggs taken during 1921.

MONTANA PLANTS WHITEFISH.

Montana has successfully introduced the Great Lakes whitefish, with the object of developing a commercial fish. The plant made in St. Mary's Lake is expected to eventually furnish the tables of Montanans with this most delectable food fish of the eastern United States.

OREGON ADOPTS POLICY OF NUMEROUS SMALL HATCHERIES.

Oregon has definitely decided upon the small hatchery with rearing ponds as against centralized hatcheries with larger capacity. The smaller hatcheries are situated near the localities where there is need for large plants of fry, and the fish, after being kept in rearing ponds at the hatchery, are liberated in nearby streams, or carried by auto trucks and planted by experienced hatchery men.

BIRD PROTECTION IN ITALY.

With regard to birds in Italy, Mr. Hawksley writes: "The last government introduced a bill for the better protection of birds in Italy, under the form of a national game law, but this shared the fate of its twenty-four predecessors in not being passed before the government was turned out of office. * * *

"We have put an entire stop to the blinding of birds and the sale of blinded birds in the city of Rome, but it is carried on very largely in Umbria and Lombardy. Some years ago it was hoped to make a special effort for the protection of birds around the birthplace of St. Francis of Assisi, but the diversion of a legacy unfortunately prevented the carrying out of this purpose."—*Bird Notes and News, X, No. 2, 1922.*

UNITED STATES FOREST SERVICE COOPERATION.

PAUL G. REDINGTON, Editor.

FOREST SERVICE SUBMITS SUPPLEMENTARY GAME REPORT.

A supplementary game report was submitted to the California Fish and Game Commission, under date of December 15. It contains a summary of reports of the supervisors of the various forests, emphasis being placed on recommendations as to the open season and bag limit for deer, on the number of hunters, and the number of deer killed in the seventeen national forests of the state.

The following tabulation is based on the best information available, showing the numbers of hunters within each forest during the past season, the number of deer killed—for which there is a record, the breeding season, based on observations and the best information available, the supervisors' recommendations regarding the proper hunting season, and the bag limit, with the number of arrests and convictions secured by forest officers during the past year with the number of cases turned over by forest officers to your deputy state game wardens.

It should be remembered that the information is only an approximation, as there is absolutely no way of definitely determining the actual number of hunters who visited each forest during the season. Also, the number of deer killed, as shown in the tabulation, is only the number which the local forest officers had definite knowledge of. It is believed this number is far less than the number actually killed as at present there is no way to make an actual check on the kill.

The rutting season is based upon forest officers' observations and observations of local people, coupled with the date when fawns are first seen in the spring in each locality. Many claim that the breeding season is influenced by the occurrence of fall storms and the variations in altitude. The supervisors have recommended hunting seasons that would practically expire before the beginning of the rutting season. They are nearly all in accord regarding the reduction of bag limit to one buck. The number of arrests made and convictions secured by forest officers for violation of the game law were cases where immediate action was necessary Many cases were turned over to your deputy warden.

Practically every supervisor in the state has recommended against the use of dogs in hunting deer. Many sportsmen throughout the state also concur in this opinion.

Forest	Number of hunters	Number of deer killed	Beginning of rutting season	Hunting season recommended	Bag limit	Arrests by forest officers	Cases turned over to state
Angeles		18	Oct. 15	Sept. 16–Oct. 15		4	
California	5,000	2,000	Oct. 15	Sept. 1–30	1	2	1
Cleveland	3,000	215	Sept. 20	Sept. 1–30	1	8	5
El Dorado	3,000	300	Nov. 1	Sept. 16–Oct. 15	1	3	
Inyo	1,300	150	Nov. 1	Oct. 1–31	1	2	1
Klamath		469	Nov. 1	Sept. 16–Oct. 15	1	3	
Lassen	3,200	400	Oct. 15	Sept. 16–Oct. 15	1	1	2
Modoc		300	Nov. 1	Sept. 16–Oct. 15	1		
Mono			Oct. 20		1		
Plumas	1,800	239	Nov. 30	Sept. 16–Oct. 15	1	3	8
Santa Barbara	3,000	345	Sept. 1	Aug. 16–Sept. 15	1	2	
Sequoia			Nov. 15	Sept. 16–Oct. 15	1	1	1
Shasta	1,130	417	Nov. 15	Oct. 1–31	1	2	3
Sierra		250	Nov. 1	Sept. 16–Oct. 15	1		
Stanislaus	5,750	700	Oct. 15	Sept. 1–Oct. 15	1		
Tahoe			Nov. 1	Sept. 16–Oct. 15	1		
Trinity	2,000	586		Sept. 16–Oct. 15	1	1	6

RECOMMENDATIONS.

Based upon the supervisors' recommendations included in this report, I desire to contiue the recommendations submitted in my report of May 15, except as hereafter modified.

I can not urge upon your commission too strongly the desirability, both from a game conservation and fire protection standpoint, of having a uniform hunting season for the entire state. This season should not begin before September 16, and should extend not longer than one month, with a bag limit of one buck. If this can not be accomplished for the Coast Range, then the state should be divided into two game districts, so far as deer are concerned—one to include the Coast Range and the other the remainder of the state. The hunting season in the Coast Range should not in any case begin before September 1, extending one month, with a one-buck bag limit.

I also wish to recommend a closed season of five years on mule deer in order that that species may not be exterminated.

Certainly the data included in this and my former report, which are based on the best information obtainable, amply justify these recommendations.—PAUL G. REDINGTON, District Forester.

FISH AND GAME COMMISSION—STATEMENT OF EXPENDITURES

For the Period April 1, 1922, to June 30, 1922, of the Seventy-third Fiscal Year.

Function	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Commissioners			$87 01		$87 01
Executive offices	$59 39	$1,289 99	1,123 32	$10 00	5,462 70
Printing			3,765 73		3,765 73
Research and publicity	13 50	1,050 00	212 86		1,276 36
Accident and death claims			451 48		451 48
Department totals	$72 89	$5,339 99	$5,640 40	$10 00	$11,043 28
Commercial fishculture and conservation:					
Superintendence	$24 53	$2,461 50	$1,083 70	$1 67	$3,571 40
Inspection and patrol	1,009 42	4,677 08	986 93	2 90	6,676 33
Research	23 57	4,451 31	455 28	325 15	5,258 31
State laboratory construction	28 38		1 00		29 38
Statistics	280 39	1,930 91	157 93		2,369 23
Market fishing license commissions			125 00		125 00
Propagation and distribution of salmon	2,130 20	2,854 63	562 73	184 26	5,731 82
Department totals	$3,439 73	$16,378 43	$3,370 57	$513 98	$23,702 71
Sporting fisheulture and conservation:					
Superintendence	$33 73	$2,280 00	$4,139 77		$6,453 50
General patrol (40 per cent)	189 43	11,685 87	8,024 67	$72 17	19,972 14
Propagation and distribution of trout	6,665 35	18,218 68	6,599 02	530 51	32,013 56
Department totals	$6,888 51	$32,184 55	$18,763 46	$602 68	$58,439 20
Game conservation:					
General patrol (60 per cent)	$259 48	$18,149 13	$18,207 52	$108 26	$36,724 39
Tahoe camping grounds	$19 17	$22 50	$22 45		$31 12
Grand totals	$10,679 78	$72,074 60	$46,004 40	$1,214 92	$129,973 70

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 9 SACRAMENTO, APRIL, 1923 Number 2

CONTENTS.

Page

RABIES IN A MOUNTAIN LION.....*Tracy I. Storer.* 45

CALIFORNIA'S LARGE GAME ANIMALS—Continued..*M. Hall McAllister* 49

SARDINES ABUNDANT NOW—BUT WHAT OF THE FUTURE?.....*Elmer Higgins* 50

PENDING FISH AND GAME LEGISLATION..... 51

EDITORIALS..... 55

FACTS OF CURRENT INTEREST..... 72

NOTES FROM THE STATE FISHERIES LABORATORY..... 73

CONSERVATION IN OTHER STATES..... 75

UNITED STATES FOREST SERVICE COOPERATION..... 76

REPORTS..... 77

Seizures..... 77

Violations..... 78

Income and Expenditures..... 79

Fishery Products..... 80

RABIES IN A MOUNTAIN LION.

By Tracy I. Storer.

(Contribution from the Museum of Vertebrate Zoology of the University of California.)

It is a general belief among naturalists and well informed laymen that the California Mountain Lion (*Felis oregonensis*) does not ordinarily attack human beings. This belief is strengthened by the experience of many thousands of people who have camped and lived in the range of the mountain lion in this state without being harmed in any way by the species. In fact there is, for California, so far as the writer is aware, only one recorded instance in which a mountain lion has without obvious provocation attacked a human being. This occurred in Quartz Valley, Siskiyou County, on June 19, 1890, when a seven year old boy was set upon and killed by two lions while he was playing among the foothill oaks at some distance from his home.* Children are believed to be slightly more subject to attack by lions than grown persons. Captive mountain lions in Yosemite Valley some years ago were observed to watch children intently even when the latter were at some distance, whereas adult people under similar circumstances aroused little or no interest on the part of the lions. The mountain

*Outdoor Life (Denver, Colorado), vol. xxxvi, no. 2, August, 1915, pp. 162-163.

lion, instead of seeking out people, usually carefully avoids them. Very few people even so much as catch sight of one of the animals.

The above general remarks are given to indicate the ordinary relations between mountain lions and human beings. There is, however, at least one instance in California where a mountain lion, evidently infected with rabies, voluntarily attacked and was responsible for the death of two persons, including one adult. This occurred near Morgan Hill, Santa Clara County, in 1909. So far as known, this case has never been made a matter of record save in the local newspaper. It has seemed desirable to ascertain and record the facts as fully as possible, and for that purpose, the writer, acting in the capacity of compiler, has gathered the available information and herewith presents it to the readers of CALIFORNIA FISH AND GAME.

The first account of this attack appeared in the *Morgan Hill Times* for July 9, 1909 (Vol. XI, No. 8), and the article is reproduced here verbatim with the exception of a final paragraph which was only of local interest.

"The people of Morgan Hill were greatly shocked about four o'clock Tuesday afternoon, [July 5, 1909] when the news reached town that Miss Isola Kennedy had been attacked by a mountain lion on Coyote creek and seriously injured. Dr. J. T. Higgins was summoned and hastened with all speed in his automobile to her assistance. He dressed her wounds as well as was possible with the appliances at hand, and she was brought to her home in town on a cot on a wagon by her father who had also been summoned. It was nearly eight o'clock before they reached home with her as they had to drive very slowly on account of her serious injuries. She was made as comfortable as possible for the night.

"Early Wednesday morning Dr. Higgins assisted by Dr. F. W. Watt, made a thorough examination of the wounds and dressed them. One ear was completely eaten off, the other ear badly lacerated, and a three-cornered cut by the right eye laid the bone bare but left the eye ball uninjured. Her left arm was fearfully mangled from bites and scratches, there being about fifteen deep gashes extending from the shoulder to the wrist and nearly a hundred lacerations from the teeth. The right arm, leg and back were also badly torn. While she is very weak from loss of blood and has suffered great pain, the doctors think she will recover unless blood-poisoning sets in.

"Miss Kennedy had gone out for a drive and picnic on the creek about four miles east of Morgan Hill with Henry Merkle, a ten-year-old boy from Fruitvale, who is visiting the family and Curtis Lane, who is about the same age. These boys with another lad, Earl Willson, were bathing a short distance above the bridge when a lioness attacked the latter boy, striking him with her claws and tearing an ugly wound in the scalp and ear. Miss Kennedy ran to his assistance, when the animal jumped upon her, knocking her down. It then tried to bite her neck, but Miss Kennedy protected her neck as well as she could with her left arm and fought heroically by jabbing the lioness with a hat pin.

"The boys ran to the tents of the Bay Cities Water Company, which are a few yards below the bridge and called Jack Conlan. He grabbed a shot-gun and ran to the relief. He fired two shots into the beast but the shot were too fine to do much injury and the animal clung to Miss Kennedy, gnawing at her arm. Conlan then ran and secured a rifle and shot the animal through the body near the heart, but not until he shot it through the head would it let go its hold. It measured eight feet in length.

"The attack seemed particularly strange as there were a number of persons in the vicinity and several houses are not far distant. It has long been a favorite picnic and camping ground and such a danger was undreamed of."

A request for details in the case sent to Dr. J. T. Higgins, M.D. (now residing in Watsonville), brought the following reply under date of December 20, 1921:

"It is a pleasure for me to endeavor to give you an accurate account of the Isola Kennedy case; inasmuch, as I have read a great deal concerning the attacks of mountain lions on human beings and find that in such cases the animal is generally not in a normal condition, as was verified by this particular case. In talking with

old mountaineers and cattlemen I have learned that dogs and horses bitten or scratched by mountain lions usually die.

"In this particular case Miss Kennedy was walking along the bank of the Coyote Creek, near Morganhill, when she saw the lion leap from the bank and attack some boys bathing in the water. Two of the boys escaped, but the third one was knocked down into the water by the lion and scratched on the scalp. Owing, probably, to the boy being knocked into the water the lion abandoned him and jumped to the bank and attacked her, she having come at this time to where the boys were.

"The lion held one of her arms in its mouth during the entire attack, the severe lacerations of her scalp and face being done by its front claws and those of her legs by the rear feet of the animal. She was knocked to the ground and laid in this position endeavoring to kill the animal by sticking a hatpin into its heart, which she was unable to do on account of the toughness of its skin. After considerable time help came to her and the animal was killed.

"Examination showed the lion to be a female, but the report that she had young was probably erroneous as there was no active mammary gland development and no young were seen in the vicinity.*

"Miss Kennedy through loss of blood was very much weakened, but made an apparently uneventful recovery, the lacerations being nearly healed. She was considered convalescent and had been out riding up to about seven weeks from the time of the injury when she developed hydrophobia and died, being sick about one week. The case was seen by three other competent physicians, who pronounced it hydrophobia.

"An autopsy performed upon Miss Kennedy's remains failed to show pus in any part of the body, even the original wounds being healed and there was at no time during her illness any reason to believe that it was septicemia or tetanus.

"Regarding the boy [Earl Wilson], who was scratched while in the water, wish to say that I made only a temporary dressing, when he returned to his home in Santa Cruz. The cause of his death was pronounced by the attending physician in Santa Cruz as tetanus, but judging from the character of the wound and the treatment it received in my office and the period of incubation I do not believe that it was tetanus, but am thorougly convinced that it was also hydrophobia.

"I believe I am in a better position to have a knowledge of this case than any one else as I was in constant attendance and gave it the closest attention and will be glad to give you any further details you may desire.

"Yours very truly,

(Signed) "J. T. Higgins, M.D."

A similar inquiry to Dr. D. A. Beattie brought a letter in which he referred to Dr. Higgins as being able to give the fullest account of the case. The following paragraph from Dr. Beattie's letter is important:

"I will say that as a consultant I saw her more than once, and I also performed the postmortem upon her. But, through the very great negligence of the doctor who took charge of the brain it was not sent to the laboratory until it had become useless. There isn't any question but this was a case of hydrophobia. There were perfectly typical symptoms, and the whole case was a picture of hydrophobia."

It may be said in explanation of Dr. Beattie's closing statement that the early symptoms of rabies (hydrophobia) and tetanus (lockjaw) are somewhat alike, and physicians sometimes have difficulty in distinguishing between the two. There is, however, one difference which marks the courses of the two diseases. A fatal case of tetanus usually terminates soon after the infection is acquired. Rabies, on the other hand, may be very slow in claiming its victim. The rabies infection travels slowly from the point of the bite along the nerves to the brain and then (in the absence of preventive treatment during the intervening time) terminates fatally.

According to the descriptions of the attack furnished above, Miss Kennedy's scalp and facial wounds were caused by the claws of the

*Mr. Conlan also states that the lioness had no kittens.

mountain lion. The lion attempted to bite her neck but she put up her arm and this the lion seized in its mouth. The infection, in a rabid animal, is carried in the saliva and on the teeth, and Miss Kennedy's infection was therefore received in her arm, probably her forearm. The head wounds were harmless from the standpoint of rabies. Had the lion bitten her anywhere on the head she would in all probability have died within a month. As it was, the infection was about seven weeks in travelling along the nerves of her arm and reaching the brain. With our present knowledge of rabies and our facilities for giving the Pasteur anti-rabic treatment, such a case, with early treatment, would stand every chance of escaping a fatal issue.

Rabies was first reported in California in 1898 when there was a small outbreak among the dogs of Los Angeles County. Another small epidemic is on record as occurring at the Soldiers' Home near Los Angeles in 1906. In 1909, the year of the mountain lion attack here described, there was a severe outbreak in several of the counties of southern California, and in the years immediately following there were epidemics in several counties in the San Joaquin Valley, but none in the coast counties so far as can be ascertained. The question of the source of the infection in the mountain lion remains a mystery.

According to the records of the California State Board of Health rabies has been detected in the following animals in California: Horses, mules, cattle, sheep, goats, hogs, domestic cats, dogs, bobcats and coyotes, and once each in the ground squirrel and gray fox. No skunks have been found positive for rabies in California.

The account given above indicates that to the species of animals now known to carry the rabies infection must be added the mountain lion through the occurrence of but one authenticated case would suggest that in this species the infection is rather uncommon. The point to be made here is that any person attacked by a mountain lion in any way should take steps to consult a physician who can determine whether there is any danger of rabies and whether preventive treatment should be started. As first aid treatment wounds made by the teeth of a lion should be cauterized with nitric acid. If the lion is killed its entire head should be packed in ice and sent at once to a county or state health officer with a request that an examination for rabies be made.

In conclusion, then, let it be emphasized that there is extremely little danger of attack from a mountain lion in California. The case here presented is only the second attack, and the first due to rabies, that has come to our attention. With the various epidemics of rabies in different counties of the state, and with the extensive epidemic of this disease among the coyotes of northeastern California, no intimation of rabies infection in mountain lions was obtained. The danger then from mountain lions in California is negligible as compared, for example, with that from the domestic dogs which roam our city streets and country roads.

Berkeley, California, January 29, 1923.

CALIFORNIA'S LARGE GAME ANIMALS—Continued.

By M. Hall McAllister.

To come nearer home—the several species of large mammals found abundant in California one hundred years ago, were several kinds of bear, deer, elk, antelope, and mountain sheep.

Deer and black bear are still here in fair abundance, but the large grizzlies are gone never to return; also both elk and antelope, being inhabitants of the level plains country, would have entirely disappeared if special efforts had not been made to prevent their extermination.

The elk species was principally represented by vast herds of valley elk also known as tule elk. When the miners arrived in California in the 40's and 50's one of their chief sources of meat supply was from the great herds of elk living in the interior valleys. By the early 70's these large numbers had disappeared and the great cattle breeder, Henry Miller of the firm of Miller and Lux, practically saved this species from extinction by protecting the small remnant consisting of a few pair on his ranch in Kern County.

At present there are about 400 valley elk of which some 300 are in two herds near Buena Vista Lake. The remaining 100 comprise small bunches which were caught up and distributed through the state by the California Academy of Sciences. These are in Yosemite Valley, Monterey Peninsula, and various parks and ranches throughout California.

The next most interesting species is the antelope, which would have become extinct some years ago except for the efforts of the societies mentioned at the beginning of this article. There are, at present, probably a minimum of 500 and a maximum of 800 head of antelope in California. The largest gathering is in eastern Lassen County, variously estimated at from 400 to 600 head. The Academy's special herd is at Mount Dome in Siskiyou County, living on the old Modoc Lava Beds and now totaling 120 head. A census of antelope made by the Academy in 1922 gave a total of 434 head, so today (March 1923) there are possibly 500 in all.

The last species, the mountain sheep, is in a class by itself. These splendid animals formerly ranged throughout the entire Sierra Nevada Mountains from the most northern to the extreme southern boundary of the state and were particularly abundant on Mount Shasta and on the Modoc Lava Beds in Siskiyou County. Today they exist only in the Southern Sierra and the desert ranges of Southern California. Here we hope they will always remain. Being protected by law and also by the forbidding and desolate country which they inhabit strengthens their chances of survival. The small herds found fatherest north in the Sierra are about fifty miles south of the Yosemite Valley on Mt. Tom, Mt. Baxter, near Rae Lakes, which are northeast of Sequoia National Park. A total census would show probably about 500 head of mountain sheep in California, divided among the ranges surrounding Death Valley and Inyo County, also small bands on Mt. San Jacinto and Mt. San Antonio, overlooking the Cajon Pass on the west.

Game Warden E. H. Ober of Big Pine, Inyo County, made a collection and observation trip from November 15 to December 15, 1922, in the Death Valley mountains and bagged about ten head for the

United States National Museum under permit from the State Commission. He actually counted 155 sheep in about three weeks time and estimated some 300 head as inhabiting those mountain ranges.

It is to be hoped, by reason of the work done and the publicity given by the societies interested, that these valuable and interesting species of big game, the elk, antelope and mountain sheep will always remain with us and be an asset to coming generations.

SARDINES ABUNDANT NOW—BUT WHAT OF THE FUTURE?*

By Elmer Higgins.

The sardine season of 1922-23, just closed at San Pedro, has been generally successful, the fish having been abundant and of high quality. But this is not indicative of the future, for investigations at the State Fisheries Laboratory indicate that great variations in the annual sardine supply may be expected—that future seasons will not be uniformly successful. Studies made during the present year, confirming previous years' results, show that not every year is favorable to the production of a large crop of young sardines, and that a year of abundant spawning may be followed by a period of several years duration in which but few sardines survive the dangers and hardships of infancy. Thus far, in the brief history of the industry, packing operations at San Pedro have depended chiefly upon the progeny of but three or four years of successful spawnings, although fruitful years have fortunately occurred frequently enough to provide an abundant supply of fish. But should the interval of poor years be long enough for an abundant year-class to be exhausted by fishing and old age, the shortage of raw material would become acute.

But the possibility of great fluctuations in the abundance of our sardines is not surprising when the histories of other great fisheries are considered. Thus, the fishery for the French sardine, the nearest relative of our own fish, has from earliest times been subject to years of depression so severe as to reduce whole fishing districts to extreme poverty, relieved only by public and private charity. In recent times the total yield of the French sardine fishery fell 82 per cent from 1896 to 1903. From 1903 to 1907, the yield remained low and a "crisis" again occurred from 1911 to 1913 in which the yield was about half that of the intervening years.

Similar variations in supply in the herring fisheries have been carefully studied by the Norwegians who have offered strong evidence that a great increase in supply was due to the abundant progeny of a single year's spawning. Thus, the take of the "fat herring" fishery in the Nordland district of Norway increased one hundred times from 1905 to 1909, due chiefly to the abundance of fish hatched in 1904, and the "spring herring" fishery from 1908 to 1911 almost doubled in quantity from the same cause. Like fluctuations have also been observed in the cod fisheries of Europe, and it is only natural to inquire of the existence and the nature of changes in our own fisheries which may have such far-reaching effects upon our economic life.

The existence of great fluctuations in supply in our sardine fishery has been discovered, but the comforting part of this otherwise gloomy

*California State Fisheries Laboratory Contribution No. 38.

outlook is that the same investigations which revealed the uncertain state of affairs provide a means of foretelling an impending period of shortage or abundance one or more years in advance, so that the prudent canner may take advantage of the natural conditions over which he otherwise has no control. An understanding of the changes in the sizes of fish taken in different seasons has been worked out, based upon a knowledge of the existence of one or more dominant (abundant) size-groups, the ages of these size-groups and their rate of growth. Hence, with continued and extended observations of the season runs, one will be able to predict in advance the *character* of future runs as to the relative abundance of the different sizes or age-classes, and in general, the parts of the season during which each size-group will appear in the fishing district. Furthermore, a shortage of sardines due to the passing of a dominant year-class may be distinguished from a shortage due to overfishing of the supply, thus providing a basis for intelligent efforts at conservation and making rational legislative control of the industry possible.

Although these and other results of the sardine investigation are clear cut and as reliable as four years' records permit, it is not appropriate in such a brief note to make an unreserved prediction of the character of the 1923-24 sardine season, for any such statement, unqualified, might prove misleading. The forthcoming report, however, will present the full record of observations enabling one to judge the validity of the conclusions. Any means, however adequate, of judging the future is of great importance, for the sardine industry in California may thus be carried a step further from the present uncertainty and be placed upon a surer basis more nearly on a level with other business enterprises.

PENDING FISH AND GAME LEGISLATION.

Reference to the Senate and Assembly Semifinal History, published after adjournment for the constitutional recess, showed that forty-five bills relating to fish and game had been introduced in the senate and forty-one in the assembly. Is it any wonder that fish and game laws become more and more numerous and more and more complicated? Some of the bills that, fortunately for conservation, have regularly been buried in committee, are on deck again, notably the one providing for bounties on predatory birds and mammals. Some freak legislation is also discoverable, among such being A. B. 920, introduced by Mr. Noyes, providing for a license of $1000 to be imposed upon any person "who is a member of a gun club or otherwise interested in any hunting preserve organized for the purpose of hunting or shooting upon game preserves or enclosed grounds." As in the past, numerous selfish special privilege bills, those providing for longer open season or larger bag limit in local areas, are in evidence.

The following outline will provide a synopsis of the more important bills placed before the legislature:

Senate Joint Resolution No. 6, memorializing congress "to modify the migratory bird treaty with Great Britain so as to allow the legislatures of the various states to provide different dates for the hunting of migratory birds, and "to allow the sale of such birds, in case more are bagged by any one hunter than he can make use of."

Senate Joint Resolution No. 14, asking for a codification and compilation of the fish and game laws of the state.

A. B. 249, prohibiting any public officer of the law from searching a private home, even under legal authority. This, of course, would make law enforcement exceedingly difficult.

S. B. 64, prohibiting aliens from "taking for sale or profit, fish of any kind."

S. B. 65, establishing the King's Peak Game Refuge in Humboldt County, and A. B. 466, providing for a game preserve in Los Angeles County.

S. B. 130, creating a special district for trout fishing in Humboldt County.

S. B. 213, reducing the black bass limit on Clear Lake to ten per day and adding one month to the present close season for the sale of catfish. Passed and signed by the Governor, April 24.

S. B. 214, providing for a one buck limit on deer.

S. B. 215, providing for a general open season on deer from September 15th to October 15th, with an earlier season of August 15th to September 15th, in Districts 2, 2½, 3, 4 and 4¾.

S. B. 251, prohibiting the use of nets to catch striped bass for six years but allowing hook and line fishing. Taking all protection from shad and leaving out possession of striped bass, making the law unenforceable.

S. B. 295 and 511, reducing the limit on quail in proposed District 4¾ (San Diego and Imperial counties), from fifteen to ten per day and closing season on mountain quail.

S. B. 302 and S. B. 508, amending section 626*k* of the Penal Code regarding the sale of ducks and geese, so as to make Federal law and state law correspond. S. B. 302 passed and was signed by the Governor on April 24.

Companion bills A. B. 324 and S. B. 581, providing increased protection for striped bass by giving sixteen more days of close season during the last of May and giving protection to all striped bass of more than ten pounds in weight.

S. B. 334, giving total protection to all tree squirrels until September 1, 1925.

S. B. 361, eliminating drag nets in District 19 in southern California and prohibiting the use of lampara and round haul nets in the taking of barracuda; also prohibiting the use of purse nets with a mesh of more than 4½ inches.

S. B. 363, amending the bounty law to provide a bounty of $100 on each mountain lion.

S. B. 405, relating to the drying of shrimps and to season and size limit of spiny lobsters and crabs.

S. B. 409, providing for increased protection for salmon by elimination of nets in the Sacramento River above the M Street bridge, Sacramento.

S. B. 436, regulating the type and mesh of nets and providing for a close season on salmon during the months of June and July.

S. B. 515, providing against the waste of fish in inland waters by making it a misdemeanor not to use or dispose of such fish for human consumption.

S. B. 527, relating to the protection of mountain sheep, and providing for an open season and the issuance of a $100 hunting license, together with a tag system.

S. B. 544, increasing the citizen's hunting license to $2 and the fishing license to $2, with a combination resident citizen's hunting and fishing license at $3.

A. B. 33, taking away from county clerks the 10 cent fee allowed for the sale of hunting and angling licenses.

A. B. 599, prohibiting the use of a "long gun" or any shotgun capable of carrying more than six shotgun shells.

A. B. 693, providing for the securing of public shooting grounds through a fund to be obtained by an additional fee of 50 cents levied upon each applicant for a hunting license. The Director of the State Department of Agriculture is empowered to secure safe titles or to accept gifts of land suitable for public shooting grounds. Administration of said public shooting grounds to be in hands of Fish and Game Commission.

S. B. 694, providing for a single-headed Fish and Game Commission, the Commissioner to be appointed by the Governor and to hold office at his pleasure. The salary is fixed at $5,000, and A. B. 1095, providing a salary of $4,000 to the president of the Fish and Game Commission who shall also be the executive officer. Two other commissioners are allowed a per diem of $10 and expenses.

A. B. 695, increasing the penalty for infraction of fish and game laws by prohibiting a convicted person from hunting or fishing, or both, for a period of twelve consecutive months after conviction.

S. B. 696, relating to fish reduction, originally setting the limit at 10 per cent, but later amended to allow unlimited use of sardines for the manufacture of fish oil for human food during the four months when the fish contain the greatest percentage of oil and limiting the use in reduction plants to 10 per cent during the rest of the year.

A. B. 764, prohibiting the use of dogs in hunting deer.

A. B. 765, providing that one-fourth of all hunting license funds shall be diverted to a game bounty fund, and A. B. 770, providing for bounties on coyotes, wolves, wildcats, skunks, weasels, raccoons, mountain lions and gray foxes.

A. B. 858, providing for the issuance of indentification tags with each hunting license, which tag licensee is required to display on the outer garment, on the back between the shoulders, in such a manner that such figures are plainly visible at all times while hunting.

A. B. 859, requiring that hunters must make statement of game killed during previous year when applying for license.

A. B. 862, amending the section of the Penal Code relating to the protection of deer in such manner as to provide protection for forked-horn mule deer whose horns commonly fork when one year old.

A. B. 919 and 1258, removing protection from the black bear.

Among the more interesting bills relating to angling are the following:

A. B. 1272 prohibiting the use of salmon eggs as bait. Similar bills have been before at least three previous legislatures.

A. B. 768, prohibiting the use of more than three hooks in the taking of fish in any lake or stream.

S. B. 412, prohibiting the taking of fish within 250 feet of any fishway, or within 150 feet of the lower side of any dam, or within 150 feet of the upper side of any stream, and providing penalty therefor.

Amendments to the fishway law were provided for in S. B. 548, and 678. Several other bills providing for minor changes in the protective laws for steelhead and for trout were introduced.

Outstanding among the bills relating to commercial fisheries are A. B. 1001, prohibiting the use of nets in the Sacramento River above

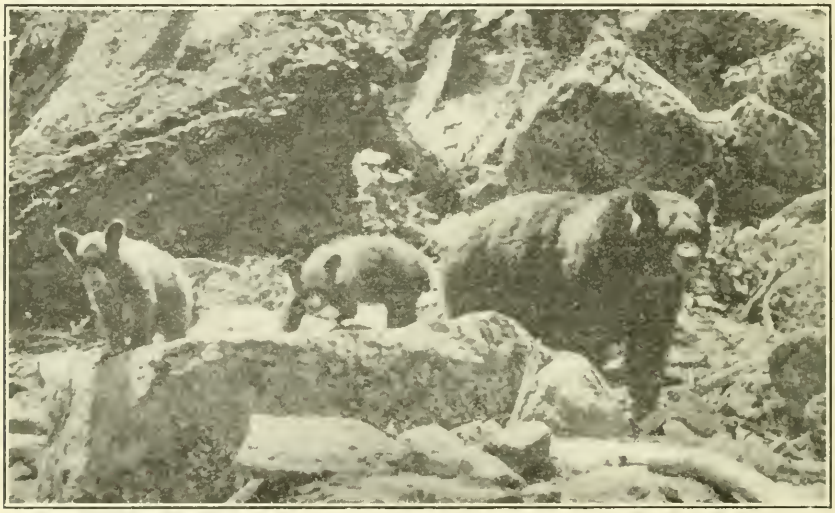

FIG. 14. Mother black bear and cubs, Yosemite National Park.

the Rio Vista bridge, and in the San Joaquin above the mouth of the Mokelumne River, and S. B. 436, giving the same increased protection to salmon.

A. B. 225, limiting the issuance of permits for fishing to citizens who are bona fide taxpayers and several bills giving increased protection to the striped bass are noticeable. Amendments to the laws regarding nets are to be found in S. B. 361, and S. B. 409.

A. B. 692, providing for night fishing for striped bass.

A. B. 826, making eligibility for citizenship a requirement for the taking of fish and shellfish of any kind whatsoever.

A. B. 792, amending the section relating to the shooting from moving boats and prohibiting shooting from scull boats in Fish and Game Districts 1½, 7 A, 8 and 9, with the exception of shooting hours on Wednesdays and Sundays. It is defective in that it omits prohibition of the use of automobiles and airplanes in hunting, and the use of boats in hunting of whales. Defects eliminated and passage recommended on April 27.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

MAY 23, 1923.

"A hunting or a fishing license is a special tax, levied against certain individuals who enjoy an occasional day afield. They pay for the privilege of hunting or fishing, as the case may be, and every cent of the money that they pay in should be devoted to conservation work and should not be mingled with the general funds of the State."

BUDGET RECOMMENDATIONS.

No matter what may have been the fate of the budget recommendations prepared for the present session of the legislature, by the time our readers receive this issue of CALIFORNIA FISH AND GAME, it is a matter of history that certain recommendations affecting adversely conservation work were made, and it is only fair that every hunter and fisherman should know the facts.

The outstanding feature of the budget, as it applied to fish and game administration, was that it provided for the placing of over a half million dollars, a sum equivalent to 45 per cent of the estimated income from hunting and angling license fees, in the general treasury during the coming two years. Heretofore, all hunting and fishing licenses have been placed in a fish and game protection fund and have been used solely for the support of fish and game conservation work. This provision in the budget seems the more remarkable in that the Supreme Court has ruled time and time again that a state can not license for revenue, but solely for regulation. The only reason why the license system is not termed class legislation is because the funds are used in a regulatory system which benefits those taxed.

Judging by the long-drawn-out debate during the session of the legislature, the budget law, passed by the people at the last election, placed the state's finances in a muddle. No one has apparently been able to solve the problem as to whether the budget law, as enacted, took in the self-supporting commissions. Much argument has not cleared the situation and probably a Supreme Court decision is the only thing that will actually settle the matter.

Certain it is that if the Fish and Game Commission is to continue to receive support from private individuals it must be able to utilize the license fees. If any of the license fees should be appropriated for other state functions, those persons who in the past have donated hatchery sites, water rights and lumber, and the railroads, which furnish free transportation, would certainly withdraw their support. As matters have been, every man who has paid a dollar for a license has had the satisfaction of knowing that his dollar was used wholly in fish and game preservation. Automobile license fees are used for the building of good roads and each owner pays his license with good grace. Likewise, the angler willingly pays his dollar because he knows that his money goes into law enforcement and the stocking of streams. Divert these funds to other channels, and the whole system breaks down. Such has been the stand taken by all. Not only did chambers of commerce, fish and game protective associations and other organizations demand that all license fees be retained in a fish and game protective fund, but the legislature itself consistently refused to vote an increase in hunting and angling licenses until it was definitely known that all such increased funds would be applied for fish and game protection and conservation.

The wild life resources of California are becoming increasingly attractive to people all over the world. Every year the number of hunters and fishermen increases. It is only reasonable, therefore, that more funds be made available for use in conserving this valuable resource. Whereas, a few years ago it was estimated that at least $25,000,000 was being spent annually because of the abundance of fish and game, yet in recent years this sum has probably been exceeded. No other natural resource brings such great dividends in money, food, health, pleasure and happiness as do the state's fish and game resources. Those who make use of these resources have been the only ones that have paid for their administration,

and they rightly demand that every dollar of income should be utilized in administering and regulating this resource.

What will come next? At the 1921 session of the legislature, a fight had to be made to save fish and game protective funds from being used for the building of tuberculosis hospitals, a worthy cause, but an unjust source of income. In the past session it has been necessary, not only to fight for the funds allotted to conservation, but also to fight for actual existence and a chance to render service. We wonder what will be demanded of friends of the work two years hence. Certainly, the safety of wild life conservation work is more and more dependent upon those who hunt and fish, those willing to fight for a cause.

Adequately to conserve wild life resources by every means at hand, to plant and restock depleted waters and game covers, and, meanwhile, to render a full dollar's worth of service for every dollar spent—this has been and ever will be the aim of the Fish and Game Commission.

CONGRESS KILLS GAME REFUGE—PUBLIC SHOOTING GROUNDS BILL.

As is so often the case, it appears to take time to put a good bill through Congress. The Game Refuge—Public Shooting Grounds bill, which was passed last fall by the Senate, was defeated on February 13th, by twenty votes in the House. Those conversant with the situation maintained that the unfortunate time when it was brought to the floor resulted in the unfavorable vote. Unfortunately, game will have to wait another year, at least, before obtaining the increased protection afforded by the bill, and those who have actively espoused the measure will have to begin the campaign all over again with the convening of a new Congress.

FIG. 15. State lion hunter, Jay Bruce, with skins of one of his lions. Mr. Bruce averages more than thirty lions a year.

HIDING BEHIND THE FARMER.

Surprisingly often those who are anxious to shoot protected birds attempt to cloud the issue by pointing out damage to crops and hiding behind the farmer. Witness the ducks vs. rice situation of the Sacramento Valley where it was shown that rice growers themselves were not interested in accepting the proffered help of hunters in relieving them of depredations by ducks. Witness the geese vs. grain situation in Tulare County a few years ago where again it was shown that it was the hunter, rather than the farmer, who exaggerated the damage in grain fields. Witness the following

petition relative to band-tailed pigeons sent the United States Department of Agriculture by residents of northern Santa Barbara County:

Santa Maria, California,
December 30, 1922.

To the Honorable
Henry Cantwell Wallace,
Secretary of Agriculture,
Washington, D. C.

We, the undersigned, respectfully petition the Honorable Secretary of Agriculture that an open season be declared for killing wild pigeons in Santa Barbara County, California.

The conditions are extraordinary and warrant the killing of wild pigeons in said county for the reason that during the months of November and December, 1922, the flight of wild pigeons has been unusual in numbers of pigeons and disastrous to the acorn crops of the hog ranches and the early grain crops of the farmers. The extraordinary flight has continued daily and will continue through January, February, and probably March of 1923.

The continuous flight consists not of hundreds but of thousands of pigeons daily, estimated at over ten thousand pigeons daily, and they confine themselves largly to the territory in Santa Barbara County lying north of the Santa Ynez River.

The pigeons are greedy feeders and they are devouring and destroying the acorn crops, in the oak forests. Hog raisers depend upon the acorns for hog feed, and the loss is a serious one.

The farmers are unable to plant their grain because the thousands of pigeons devour it as soon as it is sowed. This is causing direct loss and serious damage to the farmers.

We urge an immediate opening of the season for the killing of pigeons during the months of January, February and March, with a limit of fifty birds per hunter, with no limit on farming land where permission is secured from the farmers.

We urge that an immediate investigation be made by telegraphic communication with the California Fish and Game Commission, Sacramento, California, and through H. J. Abels, County Game Warden, Santa Maria, Santa Barbara County, California, and that open season be declared immediately.

(Signed by 18 persons, all but two listed as farmers.)

An investigation by Dr. W. P. Taylor, Assistant Biologist of the United States Biological Survey, resulted in a report as follows:

"The petition is based on a misconception, not to say willful perversion, of the facts. As noted in my report herewith, no damage, this year, to grain could be found or was reported either in the Santa Maria pigeon section or anywhere else in the pigeon country. Many acorns were left behind by the pigeons in the Santa Maria section; there is abundant green feed this year aside from acorns; and the value of acorns as food for stock is of questionable value at best, for it is reported on good authority that hogs fed on acorns put on soft fat and lose their marketability, and that acorns often cause abortion in cattle.

"The killing motif behind the petition becomes apparent in the next to the last paragraph, in which an immediate opening of the seasons is urged for the killing of pigeons during the months of January, February and March with a *limit of fifty birds per hunter*, with *no limit on farming land where permission is secured from farmers*.

"The granting of this petition (if it were possible), would pave the way for a duplication of the disgraceful slaughter of 1911-12, which is still a stench in the nostrils of conservationists, as well as in those of the better balanced residents in the pigeon sections themselves. I talked with numerous petitioners, but not one, on conversation, argued for the large limit here proposed, or for unlimited killing on farm lands. On the contrary, several of the petitioners distinctly opposed permitting slaughter like that in 1912."

The deputy fish and game commissioner of the district reports as follows:

"The movement for an open season on wild or band-tailed pigeons a few months ago in this section was principally brought about by some of the Santa Maria sportsmen, assisted by a few cattlemen and farmers in the vicinity of Zaca and Los Olivos.

"As to damage, will state that there is no question in my mind but what the pigeons have in the past done harm to the farmers in the Zaca, Los Olivos and Santa Ynez valley sections so far as grain and wheat crops are concerned, but not nearly as bad as reported. As to the acorns, will say that I have talked to cattlemen and they do not think much of the acorn as a food for cattle and hogs. The reason I am mentioning the acorn is because it was also made an issue in connection with the matter of damage caused by pigeons."

If it is time to open the season on wild pigeons let the sportsmen so state, proving their contention by a show of statistics as to augmented numbers of birds and reasonableness of a toll being taken. *But why hide behind the farmer?*

VIOLATIONS OF PIGEON LAW NUMEROUS.

We leave our readers to decide whether there could have been any possible connection between the roundup of violators of the law giving protection to the band-tailed pigeon as evidenced by the following case reports of Deputy H. J. Abels of

Santa Maria and the petition to the United States Department of Agriculture given above:

December 24, 1922, arrested G. W. Fryman, of Whittier, Cal., for a violation of section 626, hunting and pursuing wild pigeons, and on a plea of guilty, December 26, 1922, in the local Justice's Court, Judge L. J. Morris, Santa Maria, Santa Barbara County, Cal., fined the defendant $25, which he paid.

December 24, 1922, arrested R. N. Hobbs, of Lompoc, Cal., for a violation of section 626, hunting, pursuing, taking, killing, destroying and having in possession one wild pigeon, and on a plea of guilty, December 27, 1922, in the local Justice's Court, Judge L. J. Morris, Santa Maria, Santa Barbara County, Cal., fined the defendant $50, which he paid.

December 24, 1922, arrested A. B. Wurz, of Los Alamos, Cal., for a violation of section 626, hunting, pursuing, taking,

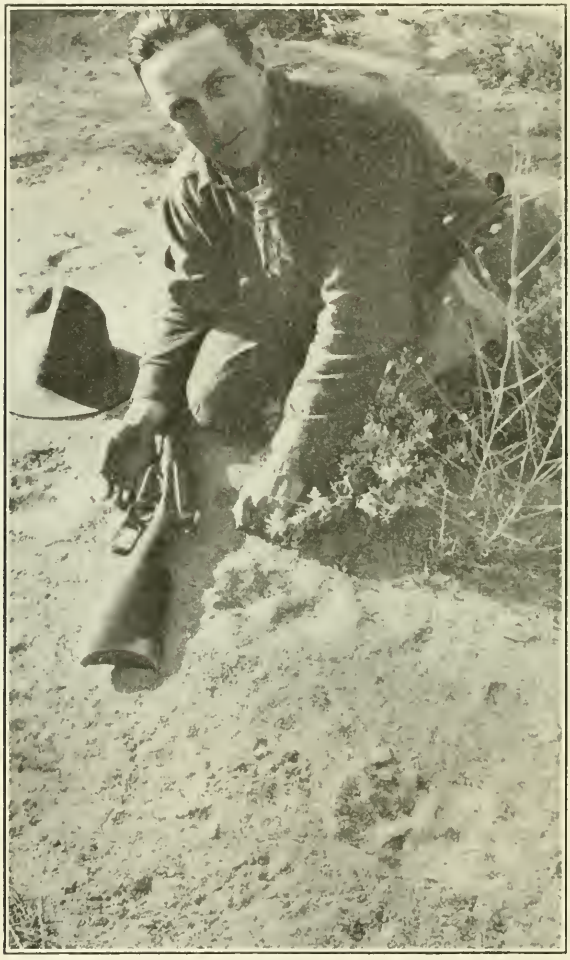

FIG. 16. Bruin left his footprints in the sand. Note the size as compared with the human hand. John Edwin Hogg, who is shown in the photograph, wears a No. 7 glove. Photograph taken in Tulare County, December, 1921.

killing, destroying and having in possession one wild pigeon, and on a plea of guilty, December 27, 1922, in the local Justice's Court, Judge L. J. Morris, Santa Maria, Santa Barbara County, Cal., fined the defendant $50, which he paid.

MANY DEFEND BLACK BEAR.

The article in the January issue of CALIFORNIA FISH AND GAME by Jay Bruce, entitled, "The Black Bear in Relation to Stock," has drawn many favorable comments from persons who know the habits of the black bear. Typical of the comments is that by A. W. Anthony of San Diego: "I want to place myself on record with Jay Bruce as a friend of the bear. For many years I was on the sheep range of eastern Oregon where black bears were common, and where I had every chance to hear the stockman howl about his loss. I often investigated the matter and have never yet found a clear case of killing by the bear."

CALIFORNIA FOREST FIRE KILLS TROUT.

There was at one time good native trout fishing in Depusquet Canyon located in the vicinity of the Santa Barbara National Forest of southern California. In July, 1914, an intensive fire burned over some 14,000 acres of this canyon watershed. The ash and dry soil carried by the winds of that summer and the following winter filled many of the excellent pools and so choked the flow of the stream as to cause a change in the channel in places. This large amount of foreign material in the waters resulted in the death of the fish, probably in part by clogging their gills, and partly by changes in the temperature and chemical character of the water and the velocities of the currents. It is well known that cool, rapidly moving waters have a maximum oxygen content. Fish developed in such waters under normal conditions may be seriously affected by the sudden lowering of the oxygen content by raising the temperature of the water and clogging the stream flow.—*U. S. Fisheries Service Bulletin, No. 92.* Jan. 2, 1923.

Pertinent to the foregoing note, the February 2, 1923, issue of the *Fisheries Service Bulletin* quotes a writer in the Kooskia (Idaho) Mountaineer, of November 29, 1922, in which two very definite causes of the death of trout in mountain streams, following forest fires, are given. In small streams, he says that the water often becomes so heated that the trout die as a result of the sudden rise in the temperature of the water, the fish being literally "scalded to death" while the fire is raging.

In some of the large streams the volume of water is too great for any such dangerous increase in temperature to occur, or for any great amount of alkalization, due to the leaching of ashes, to take place after rains following the forest fires. In such instances the death of the trout is plainly caused by the large amount of foreign material in the water, drawn into the gills of the fish in the course of respiration. One notable case is cited, that of the Selway River, following the great fires of 1910, in which the fish were found dead in large numbers along the banks of the river. Here, a severe cloudburst visited the basin a very few days after the fire and large quantities of charred wood, particularly cedar bark, were swept into the stream. As the gills of the dead fish were completely covered with the minute particles of the charcoal and the bark filaments, it was clear that these fish had choked to death.

PHEASANTS LIBERATED IN SAN DIEGO COUNTY.

The first liberation of Chinese Pheasants ever made in San Diego County occurred on February 15, when 104 adult birds were received direct from China, having been imported by the San Diego Fish and Game Protective Association. The birds arrived in splendid condition and fifty of them were released at once upon the ranch of Bert Simmons at Japatul. Mr. Simmons is distributing food for them and says that the birds seem to be getting along splendidly. The remainder of the pheasants are destined in equal numbers for Pine Hills and Palomar Mountain, where they will be liberated as soon as weather conditions are favorable. Judging by experiences of other states where Chinese Pheasants have readily become acclimated and have increased in numbers, in spite of being hunted, it is believed that the nucleus has been established in San Diego County, not only of better sport in the future, but also of better conservation of our native game birds, whose numbers are naturally supplemented by the pheasants. Until they have increased sufficiently to warrant an open season, the pheasants are rigidly protected by state law.—*Bull., San Diego Natural History Museum*, March, 1923.

QUINNAT SALMON TAKEN IN LAKE ONTARIO.

The fact that recently a quinnat salmon, heretofore found only in Pacific coast waters, was caught in the Bay of

Quinte, holds welcome promise to sportsmen that the waters of eastern Canada are possibly enriched with a new game fish. It is also the first evidence obtained that the planting of quinnat salmon in Lake Ontario, undertaken by the Canadian Department of Fisheries three years ago, may have been successful. Until this fish, a 3½ pound male in spawning condition, was caught, it has remained a mystery whether the several million fry liberated at that time would adapt themselves to a new environment and thrive in the waters of the lake, or true to the migratory instinct of the species, would find their way to the Atlantic through the St. Lawrence. The lakes and streams in the region of Lake Ontario are regarded as among the finest fishing waters of the entire continent, and the quinnat salmon, considered the best of our several varieties of Pacific salmon and attaining a weight of 18 to 30 pounds or more, would be a worthy addition to the already large list of game fish which furnish sport to anglers in that section.

STRICTER LAWS NECESSARY.

Increasing toll of living plants, insects and animals taken by the recreationists the world over, is leading to stricter and stricter laws for their protection. For some time it has been necessary to protect the edelweiss in Switzerland, as well as several species of butterflies. At the last session of the legislature provision was made for better protection for a much abused native shrub, the Toyon berry. The state of Vermont, noted among New England states for its rare ferns and flowers, has recently awaked to the fact that its flora is threatened with extinction, largely due to the commercial collection of living plants for the beautifying of grounds and gardens. Under the leadership of the Vermont Botanical Society, the first general game law was drawn up and was passed by the Vermont 1921 Legislature. This law provides that a number of rare plants shall be considered on a protected list and may not be collected for commercial exploitation. Even botanists are restricted to two specimens per season to plants named in the list. Similar restrictions on the picking of wild flowers and plants within our National parks have become necessities and it can be expected that future years will bring added restrictions in this regard. Let those who are warring against the ever-increasing number of laws take heed and by their own practice and teaching make added restrictions in this respect unnecessary.

DEER IN RELATION TO CROPS.

The state of Vermont has become famous because of the success attained in bringing back the deer to game status. From a situation that afforded no hunting whatever, this state, by sane protective methods, has increased its herd of deer until the average yearly take approaches the five thousand mark. If other states could have hunting in proportion to that afforded in Vermont, there would be no complaint anywhere. Statistics from the last report of the Vermont Fish and Game Commission show a kill of 4,477 during the year 1920, when two short open seasons of six days each were given the sportsmen. The total weight of deer killed amounted to 590,964 pounds. This, of course, means over 200 tons of highly prized food.

Vermont also claims the distinction of being one of the few states which pays claims for damage to growing crops caused by deer. A comparison of the number of dollars thus paid with the value of the annual kill is of interest. In 1920-21, $576.08 was paid in claims. In 1921-22, $568.67 was paid. Putting a minimum valuation of $30 on each of the 4,477 deer killed, we have $134,310 to compare with these damage claims.

Sometimes complaints in this state would lead one to think that deer are exceedingly destructive to crops, but careful investigations substantiate what has been proved in the state of Vermont, that such damage is greatly exaggerated.

EDUCATIONAL WORK.

Beginning in 1910 the Commission started educational work in the schools. In 1914 a separate department of Education, Publicity and Research was established. Since that time an organized campaign of education has been waged. Methods utilized have been: newspaper and magazine publicity; the issuance of a quarterly publication, CALIFORNIA FISH AND GAME, with the motto "Conservation Through Education"; conservation lectures and displays of motion pictures throughout the state and educational work in the summer resorts where people are particularly receptive to information on fish and game.

The illustrated quarterly CALIFORNIA FISH AND GAME, now in its ninth volume, has been the medium of publication for many important reports and scientific treatises, besides furnishing information on current activities of the Commission. Other series published include Biennial Reports, Teachers Bulletins, Fish Bulletins, and Circulars.

A splendid series of motion pictures are owned by the Commission and are in almost constant use. These films form a basis of many lectures as they emphasize the need of fish and game conservation. Of particular use has been the colored reel showing hatchery operations. The films are furnished free to schools and other organizations making application, provided that they furnish a lantern and capable operator.

The summer vacationist finds himself in close touch with nature, and is in a particularly susceptible mood to receive information on wild life. As a result, the vacation camps and mountain resorts of the state constitute a heretofore neglected opportunity for worthwhile educational work. During the summer of 1919 the Lake Tahoe resorts were chosen by the Commission as a field for work of this kind. Illustrated conservation lectures were given and people interested in living things by means of organized trips afield. The response was very gratifying.

At the suggestion of Stephen T. Mather, Director of National Parks, operations were shifted to Yosemite National Park in 1920. Here the work was organized along similar lines under the name of "nature guide service." As a result thousands have yearly had an opportunity to study wild life under the instruction of a nature guide and to hear a conservation message from the Fish and Game Commission. During the summer of 1922, 39,000 persons attended lectures on natural history and over three thousand followed nature guides afield to study bird and animal life at first hand. It is obvious that in no other way could so many people be reached in so short a time.

Through educational work, to build a favorable public sentiment with reference to conservation has been the outstanding aim in connection with the summer educational work.

EDUCATION FUNDAMENTAL IN CONSERVATION.

"Most clear to those who have studied the complex problem of perpetuating wild life in Vermont, stands the fact that by whatever method we may proceed to the work, education must be its ground plan and foundation." This is the introductory paragraph to the Twenty-sixth Biennial Report, 1922, of the Vermont Department of Fish and Game. One after another, the states are waking up to the fact that simple law enforcement is not the fundamental method in attaining fish and game conservation. It is quite evident that knowledge of wild life and the conditions surrounding it, imparted to old and young, is the only thing that will establish a sound basis for attaining the end sought. Of course it takes force to edu-

FIG. 17. Duck hunting on the Salton Sea. This inland body of water furnishes splendid shooting for southern California sportsmen. Photograph by John Edwin Hogg.

cate certain violators, but such violators are in the minority and education for the majority is the important thing.

The importance of making a study of conservation part of the school curriculum is becoming more and more apparent. Praise has been unstinted for Nevada, a state that provides by law for conservation teaching in the public schools. The Fish and Game Commissioners of Vermont go on to state: "Natural History as a study should have a prominent place in primary and preparatory schools in Vermont, and the true use and conservation of fish and game ought to be taught the children from specially prepared textbooks dealing with the subject." So say we all of us.

"LET WELL ENOUGH ALONE" IS MOTTO THAT APPLIES ESPECIALLY TO THE CALIFORNIA FISH AND GAME COMMISSION.

Legislative action often is of the nature of frenzy. There is sometimes an excess of outlay and other times excess of economy. At present there appears to be a tendency to retrench that is extravagant. Undoubtedly achievement may be made in economizing in some departments and commissions. But there is one in which retrenchment is not called for, and that is the California Fish and Game Commission. This commission has always been self-sustaining. It is maintained by fees on licenses issued to hunters and fishermen, canners and commercial fishermen. Its business is not only to conserve but to propagate and expand the fisheries and the game resources. This commission is not only efficiently managed, but it is also conscientiously operated as is proven by the fact that it has not only lived within its revenue, but built up a surplus of some $100,000 in recent years.

It is being proposed that the revenues derived by this commission for its own support shall be thrown into the State treasury and the funds logically belonging to it diverted to departments and commissions that have no connection with the fisheries and game resources. According to the proposed budget a half million dollars will be diverted from fish and game protection and propagation. The sum allotted for the next biennial period is so small that much of the valued research and educational work for which the commission has become famous will not simply be curtailed but entirely eliminated. To all disinterested persons the proposition is entirely illogical. But just the same, frenzy might possibly triumph over logic in this case. As one of the functions of the Fish and Game Commission is to protect, foster and expand the fisheries of California, the commercial fishermen, including the canners, in appreciation of the efforts and achievements of the commission in the past, and because of continual benefits derived, have been contributing a substantial sum yearly to sustain the commission's commercial fisheries work. The railroad companies, realizing that the commission has been making California famous for her game sanctuaries and lake and river fisheries and believing in their work, have recently decided to contribute certain free transportation for distribution and planting of fish. Those who would reduce the Fish and Game Commission organization do not appear to understand that the contributions of the sportsmen, commercial fishermen and the railroads are not likely to be diverted to the State treasury and thence to the building of public buildings, roads, etc., that have no vital connection with the fisheries and game resources, for the very cogent reason that the sportsmen, commercial fisheries and railroads might decline to contribute any further. If the money so contributed should not be devoted directly to the purposes of the Fish and Game Commission for use in conservation, propagation and research, why should the sportsmen, fishermen and railroads contribute?

Clearly, the Fish and Game Commission should be exempted in this retrenchment movement. To reduce the organization would be to hurt its efficiency which is being kept at a high point and which must be kept there in keeping with the importance of the commercial fisheries. The fisheries and game resources of California must be conserved, fostered and expanded, and the Fish and Game Commission has proven that it has the work entrusted to it well in hand. "Let well enough alone."—Editorial *Western Canner and Packer*, Mar. 1, 1923.

DEER CONSERVATION.

I have hunted deer every season, and have always been satisfied with one legal buck. What any man wants with more than one is beyond my power of comprehension. Certainly it's not the meat, for if it's meat one wants, it is cheaper on the markets. I think all the venison I've killed and eaten has averaged about $2 a pound after all the expenses were figured up. For this reason I heartily

approve the plan of the Fish and Game Commission to reduce the bag limit to one buck, and the institution of the proposed tag system. My young son will undoubtedly want to hunt some day, and when he grows up, I hope there will still be some game left to hunt.

Not long ago I had a hunting trip after bighorn mountain sheep in the Cocapah Mountains of Baja California. It was a successful trip in every way, but I wouldn't recommend it to any one as a means of supplying their tables with meat that didn't have to be paid for at so much per pound. If figured on that basis, I'd have better eaten some Imperial Valley turkey. I mention this trip into Mexico because I have observed, since I recently, that he always does his deer hunting out of season, because he fears to go into the hills when some boob hunter is liable to mistake him for a deer. If he gets caught, as he said, it's only a matter of $100 or possibly $250, and he considers that cheap insurance, with premiums that may never fall due, against the possibility of being shot by some other hunter. I hope this fellow connects up with a cheater like himself some day, and gets a .405 caliber soft-pointed bullet through his overfed bay window! This bird goes out and gets two or three bucks any time he feels like it because he's got the money to pay if he's so "unfortunate" as to get caught, while some fellow like me goes out and does it

FIG. 18. Land-locked salmon. Not a framed picture, but a live fish in an aquarium at the Mt. Shasta Hatchery. This is the last individual of the species left at any state hatchery. Photograph by H. C. Bryant.

was down there, that the Mexican government has declared a ten-year closed season on deer, bear, and mountain sheep, throughout the republic. It seems to me this is a grave mistake. I question why any such measure should have been necessary in Mexico—certainly *not* through any scarcity of game or overabundance of hunters. I believe that a ten-year closed season will only lead to wholesale violations of the law, with the game just so much the worse off by reason of it. When a country appears to be unable to enforce its fundamental laws against such crimes as murder and robbery, why talk about making new game laws?

I heard a wealthy man make his boast, "according to Hoyle," when the deer are not half so easy to get, and takes chances with the "deer hunter," who during the open season sees horns on my hat.

I had this very experience during the past deer season. The pastor of a Los Angeles church, whose name I will refrain from mentioning, let drive four shots at me with a .351 Winchester automatic. No doubt the only reason I am able to write this today is the fact that the preacher was a miserable marksman, who apparently expected to kill his venison by using an automatic rifle and laying down such a barrage that no deer could be expected to live through it. Suffice to say that the reverend gentle-

man got a verbal lacing such as he probably never received before. I actually felt sorry for the poor fellow after I got through with him, and finally agreed never to mention his name in connection with it upon the condition that he'd get out of the hills immediately—and stay out, for the rest of the deer season.—John Edwin Hogg, Los Angeles, California.

NON-SALE OF TROUT.

The non-sale of trout law has been instrumental in prohibiting the commercialization of the Tahoe and rainbow trouts. Because of the fact that a number of large steelhead trout are caught by salmon fishermen, it was deemed wise at the time the non-sale law was passed, to provide for the sale of steelhead when so taken. Under certain prescribed regulations, steelhead trout to be seen on the market, which are properly tagged, have been taken lawfully and are being sold lawfully. Many steelhead trout are shipped in from Washington and Oregon. Landlocked sockeye salmon from Washington are also to be found on the market. These are being sold under the name of trout or salmon trout. This provision in the law has made it possible to utilize the steelhead caught by salmon fishermen, and, without endangering the steelhead fisheries, has allowed this one kind of trout to reach the consumer. Let no one on the sight of trout in the market be led to believe that the trout law is being openly violated.

JAPAN INTRODUCES RAINBOW TROUT.

New Zealand and the Argentine Republic have successfully introduced the rainbow trout. Another foreign country is now making efforts to accomplish the same thing. A letter recently received from J. Itani, Director of the Imperial Fisheries Institute in Tokyo, Japan, quaintly describes the success thus far attained.

Fig. 19. Spawning Loch Leven trout at the Mt. Shasta Hatchery. Photograph by H. C. Bryant.

"We have the honour to inform you that the rainbow trout which you kindly sent to us in March this year, are now rearing in good condition at the Kizaki Fishcultural Station of our Institute. But, according to disease, the numbers of fingerling have decreased.

"We are anxious we can not have a good result in propagation of the fish by the only first transplantation. We exceedingly intend that we shall have the eggs to transplant continuously."

WOOLGROWERS WOULD BLACK-LIST THE BLACK BEAR.

At a fall meeting of the California Woolgrowers' Association a resolution was passed protesting against the depredations of the black bear and calling for a bill to be introduced in the legislature providing for no closed season, and for measures for the extermination of this animal in connection with the act providing for the destruction of predatory animals.

In the last number of CALIFORNIA FISH AND GAME, Mr. Jay Bruce, state mountain lion hunter, presented a convincing argument in favor of the bear. It is a well-known fact that the black bear feeds upon berries and other vegetation, and that it is only individuals that become sheep-killers. That monarch of the forest for which our state is named, the grizzly bear, has already been exterminated, and there is no easier way of accomplishing the same object with the black bear than by taking protection from it. It is to be hoped that some other means of protecting the interests of the woolgrowers may be found, and that the black bear will continue to receive the protection it so needs in this state.

UNDERSIZED TROUT.

There has been much discussion as to the advisability of putting back undersized trout caught on a hook. Some of the best evidence as to whether or not such fish succeed in living has come as the result of experiments carried on at the Bayfield and St. Croix Hatcheries by the Wisconsin Conservation Commission, as reported in the *Wisconsin Conservationist*. About 30 undersized eastern brook trout ranging from 4 to 6½ inches in length were hooked and then carefully removed and placed in a separate pond. Of the 30 fish that were caught at the

FIG. 20. A limit of rainbow trout taken on a fly casting rod by Mrs. John Edwin Hogg from the upper reaches of the Santa Ana River, San Bernardino County. The largest trout weighed about 4 pounds. Photograph by John Edwin Hogg, June, 1922.

Bayfield Hatchery, not one died, and some of them were hooked quite badly. Their recovery followed several days of inactivity, apparently due to injuries made by the hook. At the St. Croix Hatchery 30 undersized trout were caught with a barbed hook and 30 others with a barbless hook. Of the 30 fish that were caught with a barbed hook, 5 died, but only 2 of those taken with a barbless hook died.

These experiments appear to strengthen the attitude taken by many that if undersized fish are carefully removed from the hook they have a good chance for recovery. Certain it is that if the larger fish are most desirable the smaller ones must be left in the stream in sufficient numbers to furnish a supply of larger sized ones.

COUNTY CO-OPERATION.

Several counties have their own fish and game wardens. In some instances the deputy fish and game commissioner receives part of his salary from the county. Los Angeles County boasts of a county forester whose additional duty it is to enforce fish and game laws within the county. That this county is aiding greatly in rounding up the violators is evidenced by the following report for 1922, furnished by Stuart A. Flintham, county forester:

Department of Forestry of Los Angeles County.

STUART J. FLINTHAM, County Forester.

Game Arrests and Convictions, Los Angeles County, January 1, December 31, 1922.

Arrests	191
Convictions	187
Not guilty	1
Dismissed	3

CHARGES FOR ARRESTS.

Deer—	
Killing a doe	3
Killing a spike buck	1
Illegal possession of meat	3
Illegal possession of hides	3
Doves—	
Over the limit	2
Out of season	4
Quail—	
Out of season	4
Sale of	2
Miscellaneous—	
Killing wild pigeon	1
Ducks out of season	7
Killing non-game birds	6
Hunting without license	17
Transfer of license	1
Shooting from auto	1
Shooting from highway	8
Hunting on posted lands	15
Night hunting	9
Abalones—	
Over the limit	24
Undersize	52
Using for bait	10
Black Bass—	
Fry for bait	4
Over the limit	1
Catching with net	9
Fishing without license	4
Fines collected	$3,082.50

RIVER PATROL ACTIVE.

The launch "Quinnat," which is responsible for law enforcement on the Sacramento and San Joaquin rivers and on the Bay, rounded up many violators during December and January last. Twenty illegal nets were confiscated. Each net was about 250 fathoms in length, and worth at least $300. Each was of unlawful size or was being illegally used. Five miles of net is therefore represented in these confiscations. Those nets with small mesh will be burned, whereas those of legal size will be sold. It is only through active law enforcement of this kind that we may expect to safeguard our fishery resources and also play fair with those who are willing to obey the law.

POLLUTION OF COASTAL WATERS.

The subject of pollution of our coastal waters is receiving attention nationally and the first convention was held at Atlantic City last September. The National Coast Anti-Pollution League was the result, with Gifford Pinchot as president, and every Chamber of Commerce on the Atlantic and Gulf Coast was represented. Through this League legislation will be passed curbing pollution by oil burning steamers and large industrial plants adjacent to the seacoast. This form of pollution has destroyed fishing and bathing at most of our New Jersey seacoast resorts and will get to them all if something is not done in the very near future. However, the Hackensack, Passaic and other rivers flowing into the bay were sources of pollution before the advent of oil burning steamers and it is the duty of the organized sportsmen and the Fish and Game Commission to put a curb on this inland pollution.—*New Jersey Outdoorsman*, December 1922, p. 8.

WHAT DO TROUT EAT?

The success of stocking experiments of all kinds is largely dependent upon available food supply. Quail cannot be expected to succeed when planted in localities where food is at a premium. Trout cannot be expected to thrive in streams lacking insect life. Recently, experience has shown that the food supply of trout may be introduced along with the trout themselves. Success in such introduction is dependent upon knowledge of the normal food of trout. The United States Bureau of Fisheries, in cooperation with the United States Forest Service has been investigating the food of trout in Fish Lake, Utah. Actual stomach examinations were depended upon for evidence. The following tables furnished by Mr. S. B. Locke, U. S. Forest Service, gives the result of investigations made last fall:

FIG. 21. Packing salmon eggs at the Mt. Shasta Hatchery. By packing in this manner, eggs are successfully shipped half way around the world. Photograph by H. C. Bryant.

CONTENTS OF FISH STOMACHS TAKEN AT FISH LAKE, UTAH, From August 29 to October 31, 1922, Principally During October.

Species of fish	Number submitted	Empty, per cent of total	Per cent of number containing food in which the following classes occurred: Amphipods, G. limnaeus, H. Azteeta, scuds or shrimps	Cladocera, Daphnia, water fleas	Fish eggs	Plan st†	Gastropods, snails	Lamellibranchia, shellfish	Fish remains	Insects, etc.
Eastern Brook*	49	27	33	42	40	10	8	0	0	6
Rainbow and Steelhead	11	18	90	0	0	80	10	20	10	10
Mackinaw	2	0	100	0	0	33	0	0	0	0
Not labeled	8	7	80	0	0	16	0	16	0	0
Total	68	27	54	30	28	24	8	6	2	6

†Fragments probably accidentally included with other foods, generally amphipods. *The large number containing fish eggs is due to the fact that collections of this species were made principally after spawning began.

Remarks—From a volume basis amphipods made up at least 90 per cent of the stomach contents. Thread-like parasites were found as follows: Eastern Brook, 0 per cent; Rainbow, 10 per cent; Mackinaw, 0 per cent; not labeled, 33 per cent; total, 6 per cent.

CALIFORNIA WILD LIFE.

I have just been reading the October number of CALIFORNIA FISH AND GAME, and it has stirred my thoughts and desires, as that excellent magazine always does. In particular, my thoughts now run to the necessity for eternal vigilance and alertness in public matters and my desire to aid the increase and practical application of such vigilance.

I notice that Mr. N. B. Scofield makes a very mild and modest (tinged with hopelessness) statement of the approaching exhaustion (or destruction) of our salmon fisheries. For many years warnings have been given of this trend of affairs, yet we as a people have made no effective move to preserve this remarkable resource. The best which we have done has been to postpone the evil day.

To the whole body of California citizens the Fish and Game Commission stands in much the same relationship as do eyes to the individual man. We would not think much of the intelligence of a man whose eyes gave him repeated warning of injury to his flocks, but who persisted in keeping a sheep-killing dog until his flocks were all destroyed. Commercial interests are essential to the proper use of the salmon resource, but, like many other essential agencies, they become dangerous when out of control. If citizens of California have any pride or interest in the salmon fisheries, they must make proper provision through the legislature for salmon protection.

The case of the salmon is only one of many illustrating the necessity for unceasing attention to the conditions of our wild life resources. We, as ordinary citizens, do not know how to direct the necessary vigilance, nor do we know how to interpret the dangers revealed by it. Furthermore, we do not like to be disturbed by matters outside of the ordinary routine of our lives, and we do not like the conflict necessary to maintain our rights. For such reasons it is evident that the desirable and reasonable and practical thing to do is to appoint competent officials (such as the fish and game officials) to exercise vigilance for us and to supply such officials with funds, equipment and authority to protect our natural resources and to fight for our collective rights. In that way our own exercise of vigilance may be safely limited to maintaining the good character of our officials and to sustaining the good quality of their service.

Mr. Scofield mentions in connection with his comment on salmon the fact that commercial interests are responsible for approaching exhaustion. They have not only carried on a mad contest in catching the fish, but they have also supported powerful lobbies in the legislatures to prevent regulation. So long as there is insufficient regulation there is some excuse for the crazy activity in catching. All fishermen understand more or less clearly that a certain percentage of fish must remain uncaught within certain areas in order to produce young. Perhaps honest and intelligent fishermen limit their fishing accordingly until they see that unprincipled competitors are destroying the surplus anyway. With heavy investment in the business the honest man feels that he is then excusable for making a rush to get his share before complete destruction has actually occurred.

This, however, is not true of the lobbying against regulation. As a matter of fact, regulation favors the honest fisherman because it gives him the best possible assurance of permanence in his business. Destructive lobbying is a characteristic of the predatory interests, which can be met only by making as determined and vigorous a fight as they do. While we must depend mainly upon our legislators and other officials to make the direct fight against destructive aggression, we can add a very great deal of encouragement and moral support.

In time of war we were all made to understand that an army can do nothing without proper support at home. Most of us did many different things to furnish both moral and material aid in support of the army, and we did them not only willingly, but enthusiastically. What we call a time of peace is really a time of concentration of attack upon enemies different from those recognized in war time. The right kind of public officials need and deserve enthusiastic public support, just as much as did our soldiers and sailors in war time. The wrong kind would often be kept in the right way by proper encouragement. It seems to me that such relationships are unusually plain in connection with such a question as that of our wild life resources, but they are also apparent in other matters.

At any rate, our only hope of keeping up a supply of certain kinds of wild life is by procuring effective protection and regulation.—W. E. ALLEN (California Biological Feature Service).

UNDER FIRE.

Although political attacks are endless, and although threats are often made and guns used in connection with the law

enforcement force, yet it is seldom that such a "Black Hand" letter as the following is received by the Fish and Game Commission. As might be expected of such a letter it is anonymous:

"Fish and Game Commission,
San Francisco:

"We hear something of them raising the licenses to $5.00 for fishing and hunting. We think they are high enough and plenty of graft in them the way they are now. We will get even on all you grafters if you raise them. Here is how we will get even with you fellows. We will shoot game all year round without *any licenses*, and set fire to all the forests. How is that? Better not monkey with them.—S. F. Citizen.

P. S. *Raise it, you dare.*"

ALIENS ARRESTED FOR NETTING SONG BIRDS.

A delicate, silken net, imported from Italy and set to snare song birds, was the means of getting John Matteucci, P. Gomi and E. Bandoni, three residents of San Francisco, caught in the meshes of Fish and Game Commission law enforcement net recently. The men, who declared they were catching the birds for food, had stretched the net across a canyon at Pedro Valley and with sticks were beating the bushes and driving the birds down to be entangled in the delicate fibres, when Deputies Jack Burk, M. S. Clark and L. Sherwood closed in upon them. About a dozen small birds had been snared. The defendants were fined $100 each, by Justice of the Peace Ray Griffin. This should help to discourage other seekers after such delicate, but forbidden, bits of food.

THE FUTURE OF THE ANTELOPE.

Mr. Smith Riley, in charge of the administration of the Federal bird and big game reservations, gave an interesting discussion of the antelope problem before the American Game Protective Association in New York last December. He pointed out the danger of the antelope becoming extinct. Unlike the buffalo, it has been found impossible to breed these animals in captivity; consequently, this means of maintaining the species is not usable. According to Mr. Riley, the only possible solution of the problem is to be found in cooperation between sportsmen and stockmen, and the establishment of federal or state game refuges, under constant supervision, where antelope can be given rigid protection twelve months a year.

Mr. Riley further stated that in some localities in the West, European sheep herders who want the range of the antelope for their flocks, are wantonly slaughtering these animals. They are doing this thinking that they can save the grazing lands for their own uses by killing the antelope and thus removing cause for the Government to set aside large areas of land as refuges. Mr. Riley asserts that there is plenty of room for both the antelope and the sheep, but that unless some action is taken at once it will be too late to save this disappearing species.

MANY QUAIL IMPORTED FROM MEXICO.

From November 1, 1920, to April 20, 1921, 37,953 quail were imported from Mexico. This is the largest number imported in any one season. As heretofore, through the cooperation of the Bureau of Animal Industry, inspection was provided at the several points of entrance, but only shipments showing actual evidence of quail disease were quarantined. With the exception of about 500 birds placed in quarantine at Laredo, Texas, there were few losses due to the disease. The state game authorities of Kentucky, Maryland, and Pennsylvania received most of these quail and distributed them for propagating purposes. Those which went to Maryland, constituting almost one-third of the total number imported, sustained a loss of less than one per cent due to deaths en route.

BOUNTY LAW IN PENNSYLVANIA.

In a recent number of the *Bulletin of The American Game Protective Association*, Mr. Seth E. Gordon, Secretary of the Pennsylvania Board of Game Commissioners, describes "How Pennsylvania Controls Vermin." Historically, the first vermin laws in that state date back to 1683, when a bounty of 10 shillings was offered for the killing of a dog wolf, and 15 shillings for a female wolf. A new angle on the usual reasons cited for the repeal of the bounty on hawks and owls, enacted in 1885, is made when it is pointed out that the hasty repeal was probably due to a strain on the state's funds rather than upon a resultant increase of rodent pests. It is admitted that in the past there was much fraud in connection with the bounty system, but that at present, administration does not admit of dishonesty. During the operation of Pennsylvania's bounty system almost one million dollars has been

paid in bounties. Since 1913 the sportsmen have paid out a total of $915,777 for bounties. The total paid in bounties in 1922 amounted to $121,819.50. Skins presented in this year for bounties included 429 wild cats, 5332 gray foxes, 3525 red foxes, 9 minks and 66,726 weasels. The 1915 law provides for a bounty of $6 on wildcats, $2 on foxes and $1 on weasels and minks. Most of the vast sum paid has gone to rural residents, especially the boys on the farms, who spend their winter months in trapping.

Although the article presents an interesting defense of the bounty system as practiced in Pennsylvania, we are in doubt as to whether the increase in game can be attributed in large part to vermin control, in that a large system of game refuges have also recently been established. And furthermore, we wonder whether the amount paid in bounties in 1922 would not have been just as productive in saving game if it had been spent for law enforcement and for game refuges.

HILL AND MOUNTAIN CLUB.

The Tulare County Hill and Mountain Club, which expects to enroll thousands in its mission of protecting the hillsides from thoughtless Sunday motorists and picnickers, has taken this as its pledge of membership:

"I pledge myself to leave our hills and mountains as beautiful as I find them; to observe, and to aid in the enforcement of, all measures intended to preserve their natural features; and to respect private property and the rights of others."

The club is dedicated primarily to protecting wild flowers and shrubs and the property of people in the hills which is invaded every Sunday by thousands of motorists who often, through thoughtlessness or wantonness, do a great deal of damage besides strewing the ground with tin cans, bottles and other unsightly debris. Often camp fires are left unextinguished. Fences are sometimes broken down and gates left open.

The same state of affairs exists in nearly every attractive part of California, judged by complaints that reach the newspapers. Nothing but a great campaign of education will be permanently effective in mitigating this nuisance. Giving every resident of the county a personal interest in seeing that flowers shall not be torn up by the roots or private property roughly treated appears to be the plan of the Tulare club. The whole state of California should have a Hill and Mountain club. San Joaquin county needs one. We are ardent picnickers and the season for taking to the open is at hand. It should be a point of honor for every valley dweller who enjoys the privilege of an outing on another person's land—and most all land is privately owned—to adopt some such code of behavior as is outlined above in the pledge of the Tulare folk.—Stockton *Record*, Mar. 5, 1923.

YUKON SALMON MATURE AT LATER AGE THAN SACRAMENTO SALMON.

Striking differences between the growth and the age at maturity of the Yukon salmon, and those of the southern waters of the Pacific coast are revealed in studies made by Chas. H. Gilbert and Henry O'Malley, for the U. S. Bureau of Fisheries, and reported by Dr. Gilbert in Vol. XXXVIII, No. 928, of the Bureau of Fisheries Bulletin issued in November, 1922.

Although it is not known whether the Yukon salmon spend all of their lives in the Bering Sea, or whether they traverse the passes of the Aleutian Islands and complete their growth in the North Pacific, it is known that in May and June, when the fish seek the mouth of the Yukon, the surface temperature of Bering Sea is near 40° F. With such unfavorable temperature conditions, there can be little or no growth during the winter season, and growth may not start in the spring before the fish begin their streamward migration. In the Yukon salmon, the scale structure indicates no growth beyond that of the winter check of the previous year, so that a salmon in its fifth year would show by its scale structure the completion of but four years' growth, whereas salmon of the spawning run in rivers to the south, where temperature conditions are more propitious, indicate very clearly by their scale structure that rapid growth has already begun before the fish seek the fresh water of the streams.

A striking contrast was also observed between the early history of the Yukon king salmon fry and fingerlings, and those of the Fraser, Columbia, Klamath, Sacramento, and other rivers. In the southern waters, many of the young fish remain in the streams for a comparatively short time, passing then to the sea, where the major portion of their first year's growth is completed. These are designated as the "sea type" and they develop earlier than do those which remain in the

river during all of the first year. Often half or more than half of a spring run is made up of these second year fish of "sea type." Dr. Gilbert reports that in their studies of the Yukon salmon, no fingerlings were captured on their downward migration, and the scales of the adult fish clearly record the fact that invariably the young remained a full year in the river. Further proof is offered in the absence of the "sea type" in the Yukon runs.

The third important difference noted is that the Yukon salmon reach maturity at a later age than do those of the southern districts. In the spawning run of the Columbia River, the youngest king, or "chinook," salmon of stream type captured are in their second year, and they constitute a due proportion of the run. The second and third year fish are all males. The youngest stream type females taken are in their fourth year, and then they appear in about equal numbers with males of the same age. In the Yukon run the youngest males taken, with but one exception, were in their fourth year, and the youngest females found were in their fifth year, the females not being found in abundance until in their sixth year. This makes it apparent that maturity is reached one and, frequently, two years later in the Yukon king salmon than in the same species in its more southern range.

COURTS IMPOSE HEAVY FINES FOR ILLEGAL DUCK HUNTING.

As evidence of the increased seriousness with which violations of the Migratory-Bird Treaty Act and Regulations are being regarded by federal courts, it is pointed out by the United States Department of Agriculture that during January, reports reached the Bureau of Biological Survey indicating fines of $100 each assessed in ten cases. In two of these the defendants were required to pay ocurt costs in addition. Nine of the ten fines were imposed in January, the other in December.

Four states were represented by these cases—five of them occurred in Louisiana, two in Illinois, two in Mississippi, and one in Wisconsin. The offenses involved the possession of wild ducks in closed season, sale of wild ducks, and killing wood ducks, woodcock, and wild ducks during the close season. There were altogether 100 cases of violation of the Migratory-Bird Treaty Act terminated in January. In addition to the fines noted, a Maine hunter was fined $50 for killing ducks after sunset, and there were seven cases where the fine was $25 and costs for killing ducks, grebes' sandpipers, or insectivorous birds. Fines ranging from $1 to $25, with costs sometimes exceeding the fine, were imposed for killing nighthawks (or bull-bats), bitterns, turnstones, knots, godwits, gulls, thrushes, gallinules, grebes, flickers, robins, woodpeckers, and doves, and for possessing a night heron.

Recommendation was made for prosecutions in eighty-three cases, involving many kinds of violations of the Migratory-Bird Treaty Act and Regulations, during the month. Hunting from motorboats was a particularly troublesome form of law-breaking in many states.

BURNING OVER WASTE LANDS A MENACE TO WILDFOWL.

The practice in some sections of burning over waste land and marshes during April and May frequently results in great destruction of bird life and birds' nests and eggs, particularly on marsh land where wild ducks breed, according to the Biological Survey of the United States Department of Agriculture. The department suggests that where it is at all possible the growth should be left alone, or the marshes burned previous to the arrival of the birds or the building of the nests, which would be, generally speaking, in February and March. In many instances the burning is unnecessary and no good purpose is served by it. Due to the draining of numerous areas throughout the country for agricultural purposes, suitable breeding places for birds are constantly becoming fewer in number, and for this reason the unnecessary burning over of waste lands and marshes should be discouraged everywhere by bird lovers, conservationists, and sportsmen.

FACTS OF CURRENT INTEREST.

State mountain lion hunter, Jay Bruce, has been successful in bagging five mountain lions in the Mt. Hamilton range, east of San Jose, during the past few months "Big Jim," a lion made famous by his depredations on cattle, was among the lions captured. He proved to be of large size.

Monterey County sportsmen have organized into six strong fish and game protective associations.

In February, the Stafford Packing Company of Wilmington, California, had its license revoked for violation of the fish reduction law. It was shown that this company had used an excessive amount of usable food fish in its reduction plant.

Friends in need are friends indeed! Many fish and game protective associations and chambers of commerce passed resolutions endorsing the demand of the Fish and Game Commission that all license fees be retained in a separate fund for use in fish and game conservation.

Sportsmen of Monterey County have complained bitterly of the pike, which is said to have ruined angling in many of the streams of that county. Investigations are being made to determine the best means of controlling this fish.

Several bills calling for additional game refuges were introduced at the recent session of the legislature, notably one establishing a refuge in the coastal area of Humboldt County.

Large numbers of whistling swans fed in the rice fields of Butte County last winter. Most of them had left for the north by March 4th.

NOTES FROM THE STATE FISHERIES LABORATORY.

WILL F. THOMPSON, Editor.

THE DEPLETION OF THE NORTHERN HALIBUT.

The signing of an international treaty for the protection and study of a threatened species of fish is an important event to fisheries men. The significance of the agreement should be appreciated and its probable consequences realized. This treaty, between the United States and Canada (represented by Great Britain), for the preservation of the halibut, provides for a close season during three winter months, this to hold for a period of five years. It further creates a commission of four men, two to be appointed by each country, for the study of the life history of the halibut.

This is one of the first, if not the very first, treaties restricting marine fishing operations because of recognized and acknowledged overfishing. The possibility of exhausting one of the so called "inexhaustible" species of marine fish would seem to be proved, at least to the extent of commercial failure of the fishery. It will naturally be contended that the other species are not as susceptible, but such a plea will lose much of its force in the face of the demonstrated fact. The interest in our marine fisheries should, therefore, be intensified. The success of the close season, and of the commission for investigation in its scientific study, should be of considerable significance in the future treatment of threatened species.

There will be, also, on trial the possibility of competent international action in such cases.

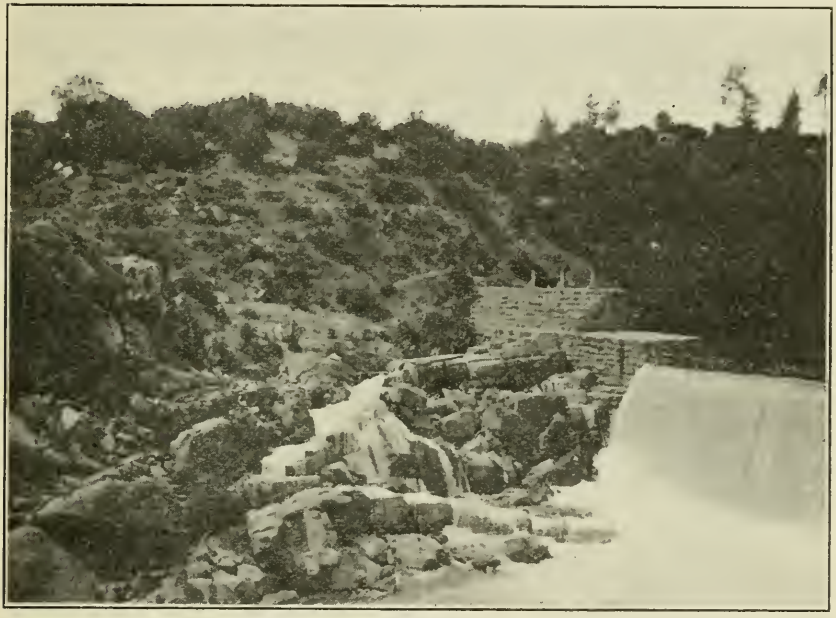

FIG. 22. Folsom fish ladder on American River. Photograph by A. E. Culver.

THE PURSE SEINE INVESTIGATION.

Dr. Skogsberg has completed his investigation of the purse seine fisheries and his report is now ready for publication. It reviews the extent, methods, history and effect upon the supply, of the purse seine fisheries. It should prove of interest and value.

THE MOVING OF THE LABORATORY.

The city of Los Angeles contemplates the moving of all the leases and streets at East San Pedro which conflict with the plans for the new Union Pacific

terminals. The Laboratory will be moved two hundred fifty feet toward the southeast, and the extent of the ground allotted to it will be reduced very considerably. Its location relative to the streets will remain the same as now. Future development in the vicinity promises to make the Laboratory grounds very valuable.

THE HAWAIIAN "SKIPJACK" IN OUR WATERS.

During the fall of 1922, when tuna were being taken in Lower California off Turtle Bay and preserved in San Diego and San Pedro canneries, there appeared very considerable numbers of *Euthynnus alleterata*, or a very closely allied species. The specimens examined, taken here as skipjack, corresponded in all respects to the descriptions of fish taken in Hawaii, and may be regarded as the same as the species found there—perhaps even the same as the Atlantic form.

The body differed notably from that of *Euthynnus pelamis*, the common "skipjack" here. Instead of tapering abruptly to the tail from the beginning of the dorsal and anal fins, as that species does, the posterior part of the body was drawn out, somewhat compressed from side to side, and the caudal peduncle was relatively long and slender. This difference between the two species of *Euthynnus* is entirely similar to that between the albacore with its thick body posteriorly, and the yellow-finned and leaping tunas with their drawn out, more slender forms. *E. alleterata* is heavy toward the head, but *E. pelamis* is nearly symmetrical. Other differences were the presence of several spots below the pectorals, a dark meat, and the absence of a marked bend in the lateral line anteriorly.

The species may be of considerable commercial importance if the meat does not prove too dark.

Attention was first called to the species by Mr. Norman Hendrickson, of the Van Camp Sea Food Corporation, into whose canneries at San Pedro some of these fish were brought.

THE USE OF FISH AS FERTILIZER.

It is taken for granted that fish should be used for fertilizer only when all demands for it as a food product are satisfied. Its use for fertilizer or fish meal assumes that there is a surplus, and that the additional strain is not a drain upon the capital, but consumes only the interest. If the extent of the supply were accurately known, it would not seem that there could be any legitimate objection to the use of whatever surplus was left.

But, as has been said before in these columns, there is no way of knowing what strain a species will stand until it is tried. There is no method of comparison by which the productivity of our waters can be compared with that of other seas, nor is there yet any basis upon which any one species may be judged more productive than another. Our waters differ widely in character from the waters of the older and better known fishing areas in the Atlantic, and our species resemble very little those existent there. The narrow continental shelf of somewhat arid California contrasts strongly with the large shallow extent of the North Sea and the great rivers which flow into it, bringing down to the sea, food elements for the enormously abundant cods, flounders, and herrings that correspond to our mackerels and sardines.

There is no way, then, to estimate the future limit of our fisheries. All we know is that they are exhaustible. The possibility and actuality of overfishing warrants the expectation that it may appear in any species, even the sardine and herring in course of time. That being true, it should follow that no fishery should be allowed to "run wild."

Yet, it is certainly a great waste to allow fish supplies which could be used to go without use. And, very obviously, if there are methods of doing this safely, it should be done. If it is possible to observe overfishing when it does occur before irreparable damage is done—as should be possible by scientific research, then once the means and methods are provided for, and put into use, exploitation should be unhampered. Research and statistics are, then, necessary to justify free development of our fisheries.

Some of our surplus may justifiably be used for fishmeal and fertilizer, but the common sense of the people of California and the canners themselves should insist that such use be carefully guarded and never get beyond control. Control over a great industry making fertilizer would be very difficult, and it would seem that caution should be exercised in allowing such to develop.

MEXICAN FISH IN CALIFORNIAN MARKETS.

Coincident with the development of California and inland markets has been the continued extension of active fishing

operations farther down the coast of Mexico. This increased activity has brought to the fresh fish markets of San Pedro several species of fish common in Mexico, but new and strange to the American public. Lacking adequate names, the dealers have given them the names of familiar domestic fishes such as "striped bass," "perch," and "barracuda." A number have been sent to this laboratory for identification, through the kindness of Captain Bernsen of the purse sein boat "Mable," and Mr. Oliver of the West Coast Fish Company. These included the following:

From Turtle Bay, Lower California, December, 1922.

Epinephalus analogus, Rock hind or "Cabrilla pinta," a bass of good quality.

Sphyraena ensis, a Mexican barracuda, or "Vicuda" differing somewhat in appearance from our local species.

From Magdalena Bay, Lower California, December, 1922.

Centropomus pedimacula, a bass-like fish, hence Mexican bass—of apparent market value, but not a *striped bass*, despite its markings.

A number of fish of little or no food value were also brought in as curiosities, from Magdalena Bay, December, 1922, including:

Diodon holocanthus, porcupine fish.

Fistularia depressa, Cornetta or trumpet fish.

Balistes polylepis, Trigger fish, and

Selene vomer, Horse-head.

The introduction of new food fishes into our markets is highly desirable, since a diversity of supply may reduce the strain on our already overtaxed popular species.

CONSERVATION IN OTHER STATES.

NEVADA WAKES UP.

A number of fish and game protective associations have been formed in Nevada and a unification has been carried out under the Nevada State Fish and Game Protective League. The official bulletin of this league shows that sportsmen of Nevada are awake to the need for better conservation, and since the slogan is "Nevada—the Home of the Antelope," it is to be hoped that this disappearing game mammal will be given needed protection in that state.

In an article appearing in the February issue of the bulletin, published by the League, the president, Mr. T. A. Read, appeals to all sportsmen, whether personally interested in the recreation afforded by wild life or not, to get behind the movement and by cooperating with organizations whose aim it is to propagate and protect the fast disappearing fish and game of the state, to preserve these invaluable resources for the enjoyment of coming generations.

In this connection it is interesting to note that two boys' clubs have been formed for aiding in this work, and the organization of others is planned. In the Junior Sportsmen's Club of Washoe County the members are sworn to "intelligence service" with the Washoe County Game Warden, and in the Reno High School a cooperative fish and game club, recently organized, declares its purpose is "to aid in bringing game law violators to justice."

NEW JERSEY ORGANIZES CONSERVATION LEAGUE.

The New Jersey Fish and Game Conservation League, organized in 1918, has been actively engaged in advancing the interests of the sportsmen in that state. In December this organization issued an attractive publication, the *New Jersey Outdoorsman*. The aims of the organization, expressed in this publication, are: The obtaining of favorable legislation; the destruction of the bird-killing cat: the reporting of violations; and the admonition of the thoughtless hunter who brags of getting the limit all the time, who kills every bird in the flock, and who is careless regarding fires, his gun and other people's property. The league also proposes to change the present drastic trespass law which is far from acceptable to the bulk of hunters and anglers. It is claimed that the present law, which affects sportsmen, was handled entirely by the Agricultural instead of the Fish and Game Committee of the legislature.

MONTANA INTRODUCES HUNGARIAN PARTRIDGES.

In the spring of 1922 Montana imported 1080 Hungarian partridges for distribution in that state. Enthusiasm over these birds was first aroused among the sportsmen of Montana by the migration of partridges into the northern part of the state from the province of Alberta,

Canada. Fourteen years ago, one hundred ninety-five pairs of Hungarian partridges were planted near Calgary and now Alberta has more of these birds than of their own native prairie chicken.

Sportsmen and game authorities of Montana are gratified with the way in which the foreign species is adapting itself to climatic and other conditions. Partridges are reported as nesting and thriving in all of the sections where liberated.

UNITED STATES FOREST SERVICE COOPERATION.

PAUL G. REDINGTON, Editor.

FOREST OFFICERS ARREST MANY GAME VIOLATORS.

Thirty-eight arrests in the National Forests for violations of the state game laws were made by officers of the United States Forest Service during 1922, and convictions secured in every case. In addition, these officers reported twenty-seven infractions of the game laws to the State Fish and Game Commission, all of which were successfully prosecuted. This action is in keeping with the avowed policy of the Forest Service, in cooperation with the State Fish and Game Commission, to stamp out game violations.

DEER POACHERS FINED.

A. P. Geerdst and D. A. Barack of Harmon Court, Oakland, Cal., were recently arrested by officers of the United States Forest Service and fined $25 each by Judge de Ferrari of Groveland for shooting at and wounding deer out of season near South Fork on the Stanislaus Forest. The men were charged with shooting fawn four times with two different caliber guns.

SUMMER HOMES IN NATIONAL FORESTS POPULAR.

If you want a summer home in the California mountains, at a nominal cost, it's high time you were getting busy, for the United States Forest Service reports that the choice lots in the National Forests are going like hot cakes. At the close of 1922 there were 3401 recreation permits in effect on the National Forests of the state, a gain of more than 15 per cent over the previous year. Of this total, 3073 permits were for summer home sites, and 288 for hotels, resorts, municipal camps and other recreation features. The leading summer-home forests are the Angeles and Cleveland in Southern California and the Eldorado, Sierra, Stanislaus and Sequoia in the Sierra region. The 3400 recreation permits in the National Forests of California return an annual revenue of more than $50,000 to the government, and the improvements made by permittees represent an investment of over $3,000,000.

RANGERS WAR ON FOREST OUTLAWS.

Forest Rangers last year killed 274 mountain lions, coyotes and bobcats on the National Forests of California, reports the United States Forest Service. The destruction of these forest outlaws will save many deer and other game, as well as thousands of dollars worth of live stock, all of which are preyed upon by these varmints. The Santa Barbara National Forest in Southern California heads the list with a kill of 105 coyotes, 53 wildcats and 41 mountain lions. The destruction of predatory animals is one of the many cooperative activities of the rangers in the interests of the users of the National Forests.

INDIANS FINED FOR KILLING DEER.

John Jordan Jr. and Sylvester Simmons, two Indians of the Paskenta region, were recently arrested by officers of the California National Forest for killing a doe each in the Lake Hollow region. Both defendants pleaded guilty in the court of Judge Lee at Paskenta and were fined $50 each. The deer meat seized was turned over by the Forest Rangers to the County Hospital at Red Bluff.

SEIZURES.

From July 1, 1922, to December 31, 1922.

Game.			Fish.		
Ducks	2,380		Abalones	181	
Quail	64		Barracuda	1,475	
Nongame birds	7		Clams	1,066	
Shore birds	28		Crabs	2,153	
Geese	51		Crabs	18½	lbs.
Pigeons	9		Lobsters	157	
Sage hens	27		Lobsters	1,582	lbs.
Doves	79		Halibut	1,050	lbs.
Rabbits	24		Salmon	1,985	lbs.
Spike bucks	4		Trout	151	
Does	2		Trout	550	lbs.
Deer meat	435	lbs.	Sturgeon	254	lbs.
Deer hides	3		Striped bass	1,524	lbs.
			Black bass	33	
			Crawfish	100	lbs.
			Crawfish	50	
			Mussels	260	

VIOLATIONS OF FISH AND GAME LAWS.

July 1, 1922, to December 31, 1922.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without a license	49	$750 00
Hunting on posted grounds	13	150 00
Birds, nongame, possession, killing	27	740 00
Birds (shore), killdeer, possession	17	395 00
Deer, possession, killing, closed season	1	25 00
Spiked buck, killing	15	843 00
Does, possession, killing, closed season	16	1,225 00
Fawn, possession	12	625 00
Deer meat, possession, closed season	29	885 00
Doves, killing, closed season	17	400 00
Ducks (wild), killing, shipping, over limit, closed season	30	1,205 00
Rabbits, killing	12	250 00
Quail, possession, killing, out of season	28	900 00
Hides, illegal possession	1	50 00
Failure to retain head or horns of deer	12	425 00
Shooting from automobile or power boat	5	110 00
Night hunting	16	565 00
Trapping without a license	2	40 00
Total game violations	302	$9,583 00
Fish.		
Angling without a license	22	415 00
Fishing (market) without a license	36	500 00
Dynamiting fish	1	200 00
Illegal fishing apparatus, nets, etc.	1	100 00
Abalones, undersized, overlimit	15	375 00
Barracuda, undersized, possession, selling, illegal	2	75 00
Bass, undersized, possession, overlimit, closed season	23	500 00
Clams, undersized, possession, over limit	42	1,225 00
Crabs, undersized, possession, shipping	3	20 00
Crawfish, under or over size, closed season	3	45 00
Lobsters, buying and selling undersized	16	375 00
Salmon, taking and possession, closed season, etc.	4	300 00
Halibut, underweight, possession and sale	3	60 00
Sturgeon, taking or possession	2	50 00
Trout, closed season, over limit	8	200 00
Fishing with grab hooks	1	100 00
Using seine net in closed districts	3	200 00
Using a set net	1	147 00
Using nets in District No. 1	5	1,296 00
Taking fish within 150 feet of fishway	2	25 00
Fishing in District No. 14	1	20 00
Snagging fish in inlets	5	125 00
Taking fish, other than with hook and line	8	195 00
Using a line in closed waters	1	125 00
Failure to make out a receipt for fish received	1	100 00
Night fishing	3	25 00
Obstruction in stream	1	25 00
Using net in District No. 12	6	500 00
Total fish violations	219	$7,323 00
Grand total	521	$16,906 00

FISH AND GAME COMMISSION.

Statement of Income for the Period July 1, 1922, to September 30, 1922.

LICENSE SALES:		
Angling	$ 60,647.00	
Hunting	70,349.00	
Market Fishing	22,130.00	
Wholesale Fish Packers	875.00	
Trapping	89.00	
Game Breeders	10.00	
Fish Breeders	5.00	
Kelp	10.00	
Total License Sales		$154,115.00
Court Fines	$ 8,235.50	
Fish Tag Sales	1,508.17	
Fish Packers' Tax	1,278.43	
Total Income		$165,137.10

STATEMENT OF EXPENDITURES

For the Period July 1, 1922, to September 30, 1922, of the Seventy-fourth Fiscal Year.

Function	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Commissioners			$55 85		$55 85
Executive offices	$61 63	$3,992 97	1,535 28	$100 40	5,690 28
Printing			829 67		829 67
Research and publicity	11 51	1,150 00	254 98		1,416 49
Accident and death claims			504 18		504 18
Department totals	$73 14	$5,142 97	$3,179 96	$100 40	$8,496 47
Commercial fish culture and conservation:					
Superintendence	$21 01	$2,385 00	$1,100 75	$8 15	$3,514 91
Inspection and patrol	1,419 43	5,196 45	1,651 96	47 59	8,315 43
Research	41 14	4,801 98	1,040 70	52 81	5,936 63
Statistics		1,293 87	28 26		1,322 13
Market fishing license commissions			131 50		131 50
Propagation and distribution of salmon	2,250 31	4,204 90	262 55	65 77	6,783 53
Department totals	3,731 89	17,882 20	4,215 72	174 32	$26,004 13
Sporting fish culture and conservation:					
Superintendence	$135 50	$2,985 81	$7,529 13	$3 25	$10,656 69
General patrol (40 per cent)	81 73	11,925 93	8,585 30	15 68	20,608 64
Trout propagation and distribution	10,482 25	19,330 67	10,297 56	154 72	40,265 20
Department totals	$10,699 48	$34,242 41	$26,411 99	$176 65	$71,530 53
Game conservation:					
Superintendence		$300 00	$7,229 18		$7,529 18
General patrol (60 per cent)	$122 57	17,888 88	12,878 18	$23 52	30,913 15
Department totals	$122 57	$18,188 88	$20,107 36	$23 52	$38,442 33
Tahoe camping grounds	$8 60	$464 25	$2 25		$475 10
Grand totals	$14,635 68	$75,920 71	$53,917 28	$474 89	$144,948 56

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1922.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Colusa, Tehama, Glenn, Butte	Sacramento, San Joaquin	Contra Costa, Alameda	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California
Albacore										195		676,099	167	126	676,587	
Anchovies								17,636		61,083		150			78,869	
Barracuda									495	10,616	36,455	69,973		89,680	817,219	525,374
Bluefish									2,445	13,038					15,483	
Boccaccio								7,772	31,666	168,913	270				208,621	
Bonito										2,106	2,523	57,336		8,521	70,486	19,251
Carp				934		6,567	2,056	26							9,583	
Catfish		41,929				179	201								45,309	
Chilipepper								1,640	11,348	50,220					63,208	
Cultus Cod	124							101,106	7,247	32,826				939	142,242	
Dolphin																
Eels																
Flounders	600						379	110,442	72	48	525	906		89	113,052	20
Grayfish								27,931						19,457	47,388	
Greenfish																
Hake	117							26,360							26,477	
Halibut								11,934	77	473	89,543	146,613	273	12,336	261,249	35,293
Hardhead						8,654									8,654	
Herring	285		12,480					44,441	1,000						58,206	
Kingfish									740	139	43	89,946		10,754	101,613	
Mackerel									2,335	198,513	1,239	414,210	18,185	13,855	648,337	648
Marlin																
Mullet														15,763	15,763	5,555
Perch	4,816		6,010				33	12,410	8	4,228		26,941	737	1,719	56,932	5,997
Pike				3		694	2,545	32							3,274	
Pompano								57		16		3,286		113	3,472	372
Rock Bass												16,235	254	3,494	19,983	1,369
Rockfish								137,177	65,322	101,473	17,147	219,027	7,128	207,379	754,653	1,772
Sablefish								42,524	26						42,550	
Salmon	168,624		402	34,987		16,636	32,597	1,758	10						255,014	
Sand Dabs								258,088				2,724	49		260,861	
Sardines			125					56,375	190	23,599,753		7,781,595		1,062,678	32,500,716	
Sculpin												13,183	20	1,533	14,736	
Sea Bass—Black												13,491		8,854	22,345	5,599
Sea Bass—White			4,163					9,173	2,040	20	6,933	59,528	1,329	23,159	106,315	269,141
Sea Trout														5,112	5,112	13,918
Shad				122		150	6,995	327							7,594	
Shad—Buck																
Shad—Roe																

Sheepshead												170	142		10,699	11,011	22
Skates								31,454		288						31,742	
Skipjack									13				1,716,748		181,062	1,897,823	1,746,446
Smelt	6,032		4,231					8,401	5,488	12,860	6,370	113,347	121,040	14,099		291,868	3,489
Sole								1,818,462	514	618	8,916	16,649	38			1,846,197	225
Splittail						819										819	
Striped Bass			622	10,415		15,832	129,749	2,368								158,986	
Stingaree																	
Suckers						248										248	
Surf Fish																	
Swordfish												786		350		1,136	
Tomcod								352								352	
Trout—Farm																	
Trout—Steelhead	145															145	
Tuna												27,044				27,044	18,471
Tuna—Bluefin												125				125	8,310
Tuna—Yellowfin												272,883		1,843		274,726	5,085,729
Turbot			2					125								127	
Whitebait								6,954								6,954	
Whitefish												2,298		1,950		4,248	
Yellowtail											6,072	441,717		772,630		1,220,419	10,081
Miscellaneous				277			615	71,292	2,298	2,091	1,271	19,719	128	958		98,649	2,167
Total Fish	180,773	44,929	28,035	46,738		49,779	175,170	2,806,617	133,334	24,259,508	177,447	12,803,701	149,348	2,469,143		43,324,522	7,759,249
Crustaceans:																	
Crabs (doz.)	929	421	515				36	8,236	3							10,140	
Ecrevisse (doz.)																	
Shrimps			82,413				10,369	93,863								186,645	
Spiny Lobsters											43,916	114,271	15,411	85,303		258,901	173,686
Mollusks:																	
Abalones										209,532	4,239					213,771	
Clams—Cockle	4,142		3,375									162				7,680	
Clams—Mixed	3,705	152	360													4,217	
Clams—Pismo									576		43,218					43,794	225
Clams—Softshell			19,760				42,194	13,225								75,179	
Cuttlefish								1,184	3,520	11,980		25				16,709	
Limpets																	
Mussels								2,272			101		800			3,173	
Oysters—Eastern (No.)			1,113 453													1,113,453	
Oysters—Native																	
Snails																	
Squid									39,950							39,950	
Miscellaneous:																	
Frogs (doz.)																	
Terrapins (doz.)																	
Turtles																	7,021

All amounts shown in pounds unless otherwise specified.

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 9 SACRAMENTO, JULY, 1923 Number 3

CONTENTS.

	Page
GAME REFUGES AND GAME MANAGEMENT ON THE NATIONAL FORESTS—*S. B. Locke*	83
REVIEW OF DR. SKOGSBERG'S REPORT ON THE PURSE SEINE FISHERIES OF CALIFORNIA—*W. F. Thompson and Elmer Higgins*	87
THE BAND-TAILED PIGEON IN YOSEMITE—*M. Hall McAllister*	99
WHY CANADA AND THE UNITED STATES COMBINED TO STOP SPRING SHOOTING—*J. H. Fleming*	101
EDITORIALS	103
FACTS OF CURRENT INTEREST	121
HATCHERY NOTES	122
CONSERVATION IN OTHER STATES	123
LIFE HISTORY NOTES	125

GAME REFUGES AND GAME MANAGEMENT ON THE NATIONAL FORESTS.*

By S. B. Locke.

The proper conservation of the game resources of the national forests under the present system of laws must depend largely on the establishment of a series of well chosen game refuges.

In a few cases Congress has established federal game preserves. A provision that such game preserves could be established by a presidential proclamation, when approved by the state involved, has been proposed and would be advantageous since some states have neglected to provide state game preserves.

State game preserves as established are not as stable as desirable, being in some instances frequently changed in size or location and occasionally based on other than sound reasons of game protection, sometimes including areas from which the stockmen have desired to exclude hunters to prevent disturbance of stock rather than to protect game.

Most of the western states have cooperated with the Forest Service in this matter and established such game preserves as have been recommended. Wherever state action is available it is possible to form immediately an effective system of such areas on the national forests.

Each game or bird refuge should be selected with certain definite objects. These will include one or more of the following:

*Adapted from Manual of Instruction issued to forest officers of the Intermountain district.

To prevent any species from reduction in numbers to such a point as will cause it to lose its value as a public resource.

To provide a place where all game can increase to a point where it overflows to adjoining areas, thus providing normal breeding stock thereon and increasing their value as hunting and recreation grounds.

To increase the game around summer recreation grounds and resorts, where this will increase their attractiveness and value to the public.

To provide a place for liberating and locating shipments of species which have been locally extinct, or are being newly introduced.

The selection of a given area as a game preserve depends largely on a consideration of the following factors:

1. Adaptability to specific species of game, preferably for the year-long season. The inclusion of year-long range is desirable but not essential. The protection of areas where game may concentrate before the hunting season closes, particularly in years of early snowfall, may make an effective game preserve where the range is occupied for only a portion of the year. Sometimes game may be so disturbed by hunters that it may drift out of large areas of suitable range and a game refuge will prevent this as well as provide protection from overshooting.

2. Necessity for preventing the extinction of rare species.

3. Absence of conflicting interests such as grazing, expanding settlements, etc. Exclusion of stock, especially cattle, is not a necessary condition for a successful game refuge in all cases. In most instances a normal stocking of cattle will not interfere with game. Sheep and goats may have to be excluded. It often takes several years for a game preserve to become stocked; there is usually an excess of summer range and areas unessential for game may be included in order to provide a practical boundary for protection so that the necessity of the exclusion of stock of any class will depend upon conditions in each individual case. The development of modern range management plans reduces greatly the possibility of conflict between stock and game. The presence of a limited amount of settlement will ordinarily not prevent a successful refuge unless there is unused agricultural land liable to result in demand for expansion of grazing privileges. In choosing game preserves it is desirable to avoid conflict with other interests wherever possible, but often certain adjustments in other uses are necessary if the game resources are to be conserved.

4. Geographic location with respect to the value of the refuge to surrounding areas as a source of overflow. A refuge so situated as to be valueless as a source of overflow is generally fulfilling only a part of its purpose. Factors preventing an overflow may result in conditions where actual overgrazing and overcrowding by game animals may exist even where there is no conflict with stock grazing. A necessary corollary to this proposition is that each refuge must be considered in position, size, purpose and administration with the system as a whole.

5. Desirability of increasing game around summer recreation grounds and resorts. There is an increasing appreciation and study of game animals by recreation seekers in such localities. The opportunity for such people to observe game animals increases their interest in and support of game protection besides being of educational value and furnishing additional recreational attraction to the forests.

Areas for bird refuges will be selected principally on the basis of the first, second and third considerations. Obviously the greater mobility of most birds renders the fourth consideration less important than in the case of nonmigratory game animals. Protection of birds on range occupied during the hunting season is more essential than the inclusion of range used year-long.

Except where descriptions follow posted boundaries of the national forests, it is preferable to describe proposed game refuges by definite topographic features which are much more easily recognized and posted than boundaries based on legal subdivisions or land office survey lines. In the absence of definite topographic features, such as ridges, streams or rock rims, roads may be used.

Whether or not game preserves are established, there are certain factors which will enter into any plan of game management.

The enforcement of the laws is a clear necessity and violation must be prevented. The entire plan of management will rely on this factor since it is dependent on protective laws. The problem is very much simplified by the selection of suitable laws and the utilization of public opinion.

A favorable public sentiment should by all means be fostered. In law enforcement, the support of at least a part of the local residents may make the difference between success or failure to accomplish the object. The backing of a local organization gives particular strength to protective laws. Where local laws are desirable, action taken to establish them should at least seem to originate locally. Even one sportsman in a locality, when convinced of the desirability of certain measures, may obtain support of signers on a petition by local people and in that case the possibility of the measure being effective is many times greater than if the law were sponsored by other than local people. Oftentimes the people in the cities are those who back fish and game protective measures; they generally constitute a large part of the hunters and fishermen, but the measures they propose will be most effective when there are local people or associations with whom they can keep in close touch and sympathy.

There has been a general tendency among hunters to not go far enough to accomplish results in game protection, the selfish feeling of not wanting to give up hunting for even short periods entirely influencing their judgment. It is true that the most progressive measures for wild life conservation have had their strongest backing by nonhunters such as wild life enthusiasts or women's clubs, and that the greatest opposition to game conservation measures comes from hunters themselves. In obtaining the interest of the public, the influence of nonhunters in wild life protection should not be overlooked.

An efficient policy of game protection and development should provide for the organization of sportsmen wherever possible. Such organizations are of inestimable value in influencing legislation and public sentiment and in assisting to make plans effective.

The personal example and the expression of opinion favorable to wild life conservation has considerable influence. The public should be educated to appreciate the value of fish and game or other wild life. This is shown by a statement of its value as a source of meat supply

or recreation for local people and the value in attracting and holding hunters from outside sections. The money spent by the latter class is an excellent index of the commercial value of this resource to the local community.

Conflict may arise between wild life interests and other activities, particularly the grazing use. The principle to govern action in such cases will be that of the highest use in each case, but the growing importance of wild life protection should not be underestimated. The adequate protection of wild life seldom requires serious curtailment of the grazing use but certain adjustments in the latter may be necessary to avoid creating conditions unfavorable to the maintenance of a game supply. Proper protection of the forests may require the establishment of open seasons such that fishermen and hunters will not be present during fire hazard periods.

A study of the forage requirements of game will govern the management of areas important for game production. It may be necessary to protect both summer and winter ranges or even to develop sources of winter feed. In the Jackson Hole country, it is necessary to provide hay for winter feeding of elk. There are certain sections in the Adirondacks where the wild hay is cut and stacked to be accessible to deer, when the snow is deep. The planting of wild rice or wild celery is very effective in providing attractive feeding grounds for ducks. The demand for seed of wild celery and wild rice for this purpose is so large that a business is made of supplying it. There is in most localities an abundance of summer range, but settlement or overgrazing of winter ranges has been the primary cause of the decrease of game. Particular attention should be given to this matter in the preparation of plans.

Hunting seasons should be established which will not interfere with the breeding, which will prevent waste of meat, which will not come at such a time as will place game at a disadvantage through driving them into poor winter feed country, and *which will allow restocking to continue.* The greatest amount of sport should be provided that is consistent with the preceding principles.

The importance of the destruction of predatory animals as a game protective measure can not be over-emphasized. In fact, this matter may mean the success or failure of game management, particularly where the numbers of game animals have been much reduced. Close observations of game conditions where predatory animals are numerous have indicated that great numbers of game animals are killed in the winter or spring when the snow is deep or crusted and where the young are just born. A mountain lion will kill one deer a day while feeding its young. The Biological Survey is accomplishing very much in destroying predatory animals and in many cases the states have been cooperating. Sportsmen and game protective associations should support actively every measure which will tend to reduce the number of predatory animals.

A recognition of the fish and game as a resource of the national forests carries with it the duty to administer it on the basis of a permanent production in as great a quantity as is consistent with the practice of forestry and the proper development of other forest resources. Through our cooperation with the states and our control over the use of the national forests, an opportunity exists for the development of practical game management which is impossible elsewhere.

REVIEW OF DR. SKOGSBERG'S REPORT ON THE PURSE SEINE FISHERIES OF CALIFORNIA.*

By W. F. Thompson and Elmer Higgins.

During the last legislative session the regulation of the purse seine fishery was a very live issue. The Commercial Fisheries Department had foreseen such a situation and during the preceding fall had assigned Dr. Tage Skogsberg of the State Fisheries Laboratory to make a thorough investigation of the purse seiners. Although completed in time for use by the legislature, the report has not been published and it has been thought best to give this advance review, the more so as there is a possibility of extending and completing the report during the coming year.

Dr. Skogsberg handled very completely a detailed analysis of the relation of the purse seine boats to the other fisheries for a period of six months of 1922. He was unable, for the lack of time, to carry this analysis through the entire year. He had at his disposal, however, a very considerable amount of data regarding the commercial catch during the last several years since the Commission has gathered data of the fisheries, and although this material did not separate the catches made by the purse seine boats from those made by other means, it assisted him in his conclusions very greatly. The presence of records of the catches of the individual boats will enable a complete analysis to be made at any time in the future, to supplement what is known from his report.

To the public unacquainted with our fisheries, some general information not provided in the report is essential to its understanding. Of the states, California leads the nation in tonnage of fishery products, yielding, during the three-year period 1919–1921, an average annual amount of nearly ninety-seven thousand tons of fish alone. California's fisheries are most concentrated near the great centers of population, San Francisco Bay region and Los Angeles County, but the southern part of the state, with one-third of the whole coast line produces one-half (50.9%) of the state's entire yield. Therefore, problems affecting southern California's fisheries have a greater proportionate importance than their aparently local nature at first indicates, and the threat of overfishing or the suspicion of wastefulness or inefficiency of methods warrants careful consideration and widespread popular interest. Dr. Skogsberg's report is, from this standpoint, of particular value.

As he says: "In the last few years the supposed destructive influence of the purse seine boats on the supply of fish in our waters has been much discussed among professional fishermen, as well as among other persons interested in southern California sea fisheries and their future, and articles to the effect that aliens were destroying the California natural fish supply by means of purse seines have repeatedly been published in the newspapers. ('For many of them,' the purse seiners, 'nothing is more pleasing than to enrich themselves at our expense and risk.') One of the main objections against these men is that they, by killing small fish in enormous quantities, are depleting the barracuda. There is a fairly widespread opinion that purse seining for barracuda, white sea bass and yellowtail should be prohibited in southern Cali-

*California State Fisheries Laboratory, Contribution No. 40.

fornia. A critical reader and listener could, however, not help being impressed by the looseness of the statements and by the fact that the complaints mainly are based on hearsay and only to a very little extent on personal and more or less systematic observations."

The need for care in coming to any conclusion as to the effect of purse seining is plain when their importance to the markets is considered. It is only common sense to be careful in rejecting a source of supply for the feeding of our fast increasing populations, and the need for steadiness of judgment is especially present when the plea is made that the conservation of that source is involved. (See Fig. 23.)

And Dr. Skogsberg clearly shows that "it is clear that the fresh fish markets to a very large extent depend on the purse seiners for their supply. Of the species of major importance to the fresh fish trade only the halibut and the rockfish are not taken by purse seines. Of the

FIG. 23. A purse seine boat at Municipal Wholesale Fish Market, Los Angeles Harbor. Photograph by W. F. Thompson.

remaining ones the mackerel is mainly caught by the small boats, the barracuda, white sea bass and yellowtail principally by purse seine boats. During the winter months the barracuda and white sea bass are almost exclusively landed by purse seine boats. Taking into consideration that the mackerel is a fish with relatively low market value and that the barracuda and white sea bass are high priced fish much appreciated by the fish-eating public, we are fully justified in saying that, without a more or less steady supply of the three last mentioned fish throughout the year, the fresh fish markets would not be able to furnish the public in southern California with a sufficient supply of desirable fish."

Not only is it true of the present, but it will be increasingly true in the future, that the purse seiners must be depended upon for a large part of the supply. "A process which has occurred in other older fisheries has begun here, namely, the outgrowth of the domestic supply by

the demand, so that fishing grounds farther away are being used. It will be interesting to see how far the process, which in Europe carries fisherman to the Barents Sea and to tropical Africa, can and will go." (Thompson, The Fisheries of California and Their Care, CALIFORNIA FISH AND GAME, Vol. 8, No. 3, p. 167.) "It is evident by now to almost everybody well conversant with the problems connected with our fishery industry that our local supply of fish for the fresh fish markets is very limited." (Dr. Skogsberg mss.) But, "the exploitation of distant fishing grounds implies the existence of a fleet of large sea-going fishing vessels, economical in operation and fit to carry big loads of fish (on ice, or otherwise preserved), long distances. What will be needed are vessels, large, speedy and economical enough to be able to operate with profit as far away as the Gulf of California and along the coast of Central America. We have, at the present time, in southern California, no vessels approaching this type more nearly than the purse seine boats; they are the only ones which, on a large scale, undertake fishing expeditions to distant waters (along the whole west coast of Lower California). The purse seine fleet provides the only hope for the future development of our fishing industry according to the principles outlined above. A great number of the present purse seine boats have a considerable cruising radius and carrying capacity and they show signs of development in these respects as well as with regard to economy of operation. The reduction of the cost of operation by the installment of crude oil engines, for instance, will probably imply a considerable increase of the radius of action of these boats."

Purse seine methods and gear.

It is naturally of importance to know something of the methods of the fishery which is under investigation, and Dr. Skogsberg briefly describes these, as follows:

"The term 'purse seine boat' has been used in this report in the restricted sense commonly employed in southern California, i. e., it refers to rather large boats generally of between twenty-four and forty-two gross tons, furnished with turntables upon which the seine is piled, and operating a seine of the type described below. The boats are about 65 feet long, 15 feet wide, 7 feet deep, and are powered with fifty to eighty-five horsepower engines using distillate, distillate and gasoline, or, in a few, crude oil as fuel. During the last few years the building of such a boat has cost between ten and fifteen thousand dollars; in exceptional cases as much as twenty thousand dollars has been paid.

"The crew consists of the captain and six or seven men when fishing for 'whitefish,' but during the tuna season one or two additional men are carried because of the greater size and weight of the tuna seine.

"Two purse seines are required, one for the catching of bluefin tuna and one for 'whitefish'; that is, barracuda, white sea bass, and yellowtail. The tuna seines are about 240 to 320 fathoms long and 23 to 34 fathoms deep, stretched web, and the web is stronger and has larger mesh than that of the whitefish seines. The latter are about 200 to 250 fathoms long and 12 to 24 fathoms deep, stretched web. A new purse seine costs on the average between $4,000 and $5,000. The web of the tuna seine, which is the most expensive part, must, as a rule, be renewed every season, and in the whitefish seine every other or third season. It happens not infrequently that smaller or larger parts of web and

ropes are lost by accidents caused by submarine rocks, strong currents, and so forth."

Dr. Skogsberg, in an appendix to his report, presents a careful and detailed technical description of a purse seine net, materials, construction, and use. To quote briefly, "* * * a purse seine is built like a long shallow curtain without any bag in the middle. Its upper edge is buoyed with numerous corks on a strong rope, the cork line, which keeps the seine floating with the cork line at the surface of the water. Its lower edge is weighted with numerous leads on a light rope, the lead line. * * * Along the entire length of the lead line there are a great number of uniformly distributed rings, the purse rings, fastened to the lead line with short ropes. * * * Through these rings runs a heavy rope, the purse line, the ends of which are tied to loops at the ends of the cork line. * * *

"The purse seine is piled on the turntable in the stern of the boat. A skiff is towed behind. When a school of fish is to be corraled, the skiff is released while the purse seine boat is running full speed, and its weight drags the end of the net into the water. As soon as the seine has been laid out in a huge circle around the school, the ends of the purse line are untied and the bottom of the net is closed with all possible speed by the pulling in of purse line, which is done by winch. The seine is then hauled in from the skiff end until the fish are concentrated in the bunt end of the seine, from where they are landed on the purse seine boat by means of a dip net."

History of purse seine fishery.

The reviewers have taken the liberty, for the sake of popular interest, of adding a few remarks, not contained in the report, on purse seine fishing in other localities, showing that this method is by no means a novel or local development in California.

The first purse seine is reputed to have been invented in the State of Rhode Island in 1826 and was used in the mackerel fishery. It was undoubtedly merely an improvement over the older types of gear then in use, but its success led to great expansion of the mackerel fishery, and it is now used extensively from Cape Hatteras to the bay of Fundy and the St. Lawrence. The net was soon adapted to the menhaden fishery and is now, and long has been, the chief means of capture of the menhaden throughout the middle Atlantic states.

The purse seine was introduced into Norway in 1878 by a Gloucester, Massachusetts, fisherman who went to Norway to engage in the annual mackerel campaign, and in order to compete with the Americans the Norwegian government distributed purse seines among its own fishermen, and had full descriptions of the gear published. The mackerel purse seines in Norway were soon adapted to the herring fishery, and that method is now one of the chief means of capture of that fish.

From Norway, purse seines were introduced into England, but they are used only to a limited extent in the West Country in fishing for pilchards (sardines). In other sardine fisheries of Europe, however, the purse seine plays an important part. In Spain the purse seine is the most efficient gear used, and in Portugal the purse seine ("cerco americano") and a kind of fixed gear yield the bulk of the catch of sardines in the winter and in the summer of *Caranx trachusus*, a relative of our "horse mackerel." In France alone are purse seines not

used, for there the introduction of improved gear in the fisheries is prohibited by law. Purse seines of the ordinary type along with "improved purse seines" are also used in Japan for the capture of mackerel, tuna, and sardines.

On the Pacific coast of America, purse seining has reached its highest efficiency in the great salmon fishery of the Puget Sound region, and in southeastern Alaska. From this, the southern California purse seine fleet has been largely recruited. That for the salmon is probably the oldest purse seine fishery in the West, and is reported by Cobb* to have been started in Puget Sound by Chinese in 1886. The first gas-powered purse seine boat was first used on Puget Sound in 1903, and the industry rapidly increased from then on, but a power boat of almost modern type was built ten years earlier at San Pedro and used for purse seining for mackerel, sardines, barracuda and other fish. The same method was used in the Monterey sardine fishery at the beginning of its modern development in 1903.

The report takes up the history at this point: "The purse seine fishery in southern California was begun as early as 1893. In that year the first purse seine boat, appropriately named 'Alpha,' was built at Los Angeles for operations in our waters. * * * In 1895 and 1898, two other purse seine boats were built at the same place, but they fished in southern California waters for a few years only. * * *"

Purse seine fishing on a relatively large scale was not started in southern California before 1915, when five boats, all built at Los Angeles, began operations. The following year two were built and in 1917 two more were added to the fleet. During these years barracuda, white sea bass, yellowtail, and mackerel were caught, but practically no tuna. Their success attracted fishermen from Puget Sound, and in 1918, eight purse seiners from the north arrived and with eight more locally built boats started fishing for "whitefish" and tuna as well, which proved quite successful.

Expansion in the purse seine fishery paralleling the war boom in other lines continued, reaching a peak of production in 1919, but continuing to expand in equipment until 1920. More boats came from the north, building increased at San Pedro and San Diego, and in 1920 between 100 and 125 purse seine boats were operating in local waters. In 1919, enormous catches of bluefin tuna were made, netting rich returns for the fishermen and boat owners, and the "whitefish" operations were equally successful. In 1920, however, the total bluefin yield was about one-third less than in the previous year, and the proportionate return decidedly less on account of the increased numbers of boats fishing. The yellowtail fishery fell, due to lack of demand, and the slight increase in the white sea bass and barracuda catch hardly balanced the season's failures. As a result, many boats returned to northern waters.

The reverses of 1920 were only aggravated by the failure of the 1921 season. Operations for tuna, barracuda, and yellowtail were unsuccessful and only the yield of white sea bass exceeded previous years. The number of boats operating was still further reduced and building was practically stopped. By 1922 only fifty boats were operating for tuna and, although the yield was somewhat better than the previous year,

*Cobb, John N., The Pacific Salmon Fisheries, Appendix III, Report of the U. S. Commissioner of Fisheries for 1916, p. 80. Washington, 1917.

only a few were comparatively successful; most of them did not even cover their expenses for equipment, upkeep and operations. The 'whitefish' fishery of 1922 was a moderate success, sixty-five boats operating during a longer or shorter period during the year.

Since 1920, a decided change has taken place in the ownership of the fleet. The amount of money invested in the purse seine boats in 1920 probably approximated two millions of dollars. The larger part of this money, representing life savings, was invested by the fishermen themselves. During 1920, 1921 and 1922, continued reverses were met by increased loans to meet operating expenses, and actual financial control of the boats and gear gradually passed from the fishermen to banks and canners, by means of mortgage, foreclosure and outright sale. At the end of 1922, only about half a dozen purse seine boats of southern California were independently owned. "This fact should be remembered when purse seine fishermen are denounced as aliens prospering at the expense of Americans.

"The decline of the purse seine industry in southern California was certainly not caused by the overfishing of the species on which it depends," as is shown in this report. Many circumstances have contributed to bringing it about which can only be enumerated here. "The cost of operation, which during the last years of the World War had become extremely high, showed little tendency to fall during 1919–1921. At the same time the intense competition between the many boats brought about a recurrent oversupply in the markets, causing a considerable decrease in the wholesale prices of fish. Strikes broke out among the boat pullers during the best seasons. Canned yellowtail proved to be unsuccessful in the market. * * * The bluefin tuna operations of 1921 and 1922 failed, probably due to natural fluctuations as well as moderate demand. It may be just to say that the purse seine industry became a victim of the economic crisis following the war boom."

Fishing ports, and relative importance.

As a means of estimating the relative importance of purse seines and other gear, and as a possible means of understanding various objections raised against purse seining, it is useful to consider the destination of the purse seiners catch. "Of the sixty-five purse seine boats operating in southern California waters in 1922, only two had San Diego as their home port, the rest belonging to the Los Angeles fishing fleet." Of course, the report continues, a fishing boat does not always deliver its catch at its home port, but it probably holds true that the fishermen pick as their home port the place where they can and do sell most of their products. Of the three species caught chiefly by purse seines, barracuda, while sea bass and yellowtail, 40 per cent of the total landings at the two ports, for 1919–1921 from local waters, was landed at San Diego, and 60 per cent at Los Angeles (Los Angeles County). The predominance of Los Angeles as a fishing port is further emphasized by adding the great Mexican catch landed in California. Of the average annual catch (1919–1921) of 3,323,000 pounds from Mexico, about 70 per cent was landed at Los Angeles, and of the bluefin tuna, caught almost exclusively by purse seines, Los Angeles County received in the same period practically all of the catch.

Obviously, the landings in Los Angeles are best adapted to an analysis of the purse seine activities.

Species caught by purse seiners.

Dr. Skogsberg considers in detail the relation of the purse seiners to the supply of the separate species, both those handled by the canners and those used fresh, limiting himself to Los Angeles County, for the reasons given above. Of those forms canned, the sardine, albacore and bluefin tuna are most important. Of those used fresh, the barracuda is much more important than other species, but there are also the California halibut, the yellowtail, the mackerel and the white sea bass. The purse seines play a very important or predominant part in the supply of bluefin tuna, barracuda, yellowtail and white sea bass.

Barracuda.

In most years, he says, the barracuda begins to appear in large quantities near the coast (inside the three-mile limit, often just outside the kelp beds), in the beginning or middle of March. During this month and especially in April, they are found

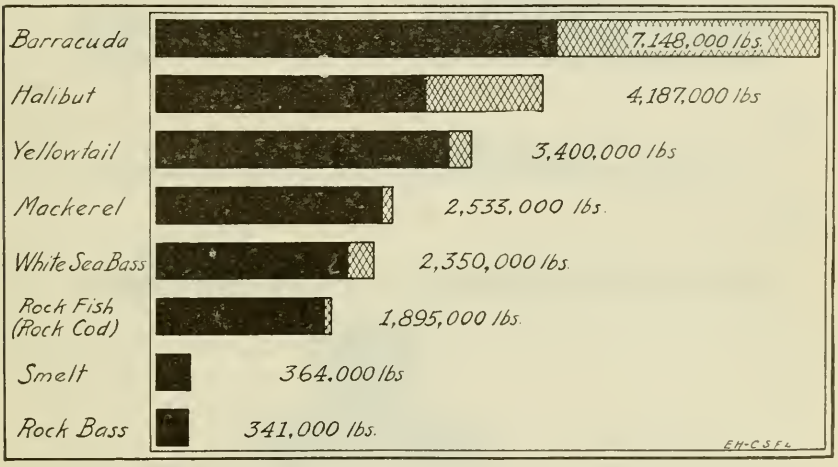

FIG. 24. Yearly landings of the more important market fish in southern California. Values are the average yearly total amounts for the period 1919–1921. Solid black, from local waters; shaded, from Mexico.

in very large schools, a fairly large percentage of which are less than the legal size, and they seem to be limited to a region between the Coronado Islands and a point midway between Oceanside and Point San Juan. Later in the spring these large schools appear to split into smaller units, and in May they begin to appear in other localities, as Newport, or San Clemente and Santa Catalina Islands, and at that time the spawning season begins. During June the climax of spawning is reached and during that month and July the fish are found along the kelp beds of the whole coast of southern California. Spawning takes place as late as August, at least, and during that month and September, or even later, the fishery is to the northward of San Pedro. During the winter months most of the supply is taken in Mexican waters, but there seems very little reason to believe that there is a migration to the southward from our waters, as occasioned catches can be made in them throughout the year, at times from very large schools.

The catches made each month are shown on the accompanying graph (Fig. 25), made from data given by Dr. Skogsberg, and it will be noted that heavy catches of local fish are made in April, May and June, but that during the balance of the year the large catches come from Mexican waters. It is pointed out in the report that the alternation of the local and Mexican supply is highly advantageous, and that the latter has been increasing at a rapid rate.

The relation of the purse seiners to the supply of barracuda has been carefully analyzed from statistical records of the Fish and Game Commission by Dr. Skogsberg for the first six months of 1922, and he supplements this by evidence gathered as to the remaining months from various sources. During January, February, March and April, as well as October, November and December, the purse seine fish form the greater part of the catch, varying from 96 per cent in January to 85

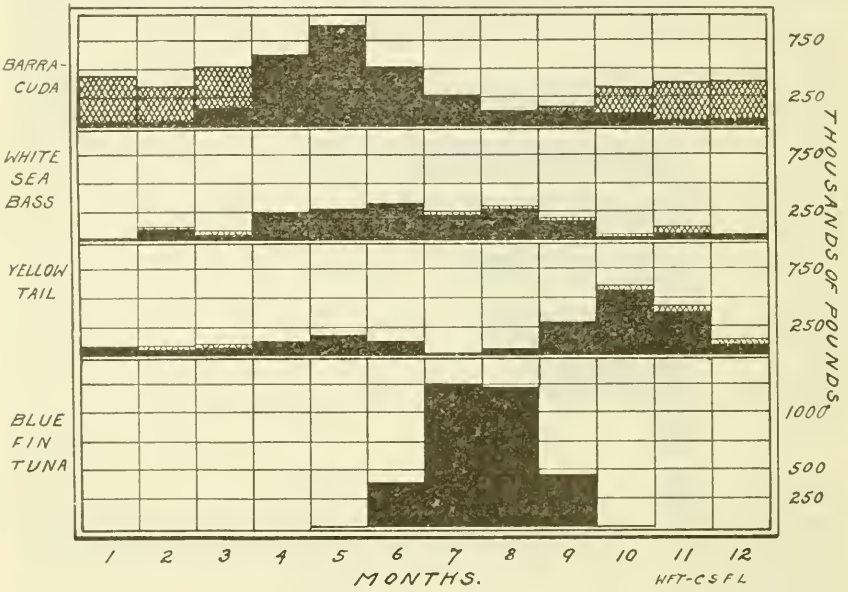

FIG. 25. Catch of chief purse-seined fish in Los Angeles County, according to months. Fish caught in local waters shown in solid black, those in Mexican, shaded. Quantities shown are averages for 1919, 1920 and 1921, save those for bluefin tuna, which are values for 1922 only.

per cent in March. This was mainly Mexican fish, not local, save during April. But during May and June, also during July and part of August, the small boats played the chief role, bringing in local fish only. "The small boats—the gill net and round haul boats—are capable of furnishing the markets at San Pedro with a rich supply of barracuda only from the middle of May to the middle of August. They depend almost entirely upon local waters for their catches. During the rest of the year the markets are absolutely dependent upon the purse seiners for their supply of this fish. The fish landed during this period is to a very large extent of Mexican origin."

It is especially noted that the months during which the smaller boats —not purse seiners—bring in their large catches of local fish are parts

of the spawning season, and that the purse seiners draw heavily on the local supply during April only. The purse seiners therefore, it might be concluded from Dr. Skogsberg's report, although he does not so state, are actually assisting in the conservation of our overstrained local supply of barracuda by equalizing the demand on Mexican and local waters, and by drawing upon the fish during the winter months. Only during April is this not true, for then large supplies of small local fish are taken by the purse seiners.

Dr. Skogsberg is, from a consideration of all available evidence, unable to see any promise that the small boats could replace the purse seiners during the winter months.

The white sea bass. The white sea bass fishery bears a certain resemblance to that for the barracuda. The six summer months, April to September, yield the heaviest local catches, and the catch is not as concentrated in point of time as is the local barracuda catch. During October, November, December and January the catches are small, particularly the local ones. As a whole, the catch of Mexican fish is relatively unimportant, the percentage varying in the years 1917 to 1921 from 3.5 to 19.9.

The purse seiners provide the greater part of the supply of white sea bass landed in San Pedro especially in the winter months. The percentages for the first six months of the year 1922 were: January 98 per cent, February 84, March 70, April 71, May 60, and June 11 per cent. During July the small boats still brought in large quantities, but during the remainder of the year the purse seine predominates. An estimate of 45 per cent of the total catch as of purse seine origin is not wide of the mark. The purse seiners do not, therefore, have the same importance in the white sea bass fishery as in the barracuda fishery. Nevertheless, they furnish the markets with very large amounts of white sea bass, and during the winter months they are almost the only ones landing this fish.

Yellowtail. The occurrences of the yellowtail is also in general similar to that of the barracuda, the fish appearing first in the southern districts, according to Dr. Skogsberg's information, but the maximum catch of yellowtail is in the fall, when the barracuda have become scarce. This may possibly coincide with the spawning season, but the data in his possession are not sufficient to lead to a conclusion. September, October and November yield the heaviest local catches. The summer months are relatively poor. Mexican fish plays a very small role at any part of the year, between 88 and 97 per cent being of local origin in the several months, but the Mexican supply is steadily increasing. Of the total of the species landed in San Pedro by far the greater part is brought in by purse seine boats, an even higher percentage, in fact, than in the case of the barracuda, and the importance of the purse seines is, again, greatest during the winter months. The remainder of the catch is landed, for the most part, by round haul boats whose gear resembles that of the purse seiners.

The bluefin tuna. The bluefin tuna fishery shifts to the north in a fashion similar to that of the barracuda and yellowtail, but begins in June, reaches a climax in July or August, and ends in September, making it a highly concentrated fishery. The species occurs in large schools which split up into smaller units

while feeding. No ripe spawn has ever been found in them. The purse seiners are almost the sole means of taking this species, which is so important to the canners of southern California. The loss of the catch would fall very heavily upon Los Angeles County canners, but the opinion is expressed that despite this fact the erratic nature of the catch and the low prices realized threaten to drive the purse seiners out of the business.

Purse seines and conservation.

In view of the detailed evidence which Dr. Skogsberg presents, it is evident that the destructive nature of the purse seine has been overrated. The individual fisheries considered show as yet no signs of overfishing which can confidently or even reasonably be laid at the door of the purse seiners any more than at that of any other method of fishing.

"The question as to whether the barracuda is being overfished can not, of course, be settled as yet, no scientific proofs bearing on the problem being available at the present time. A solution of this important question requires a careful statistical analysis of the catches of several consecutive years. Such investigations should be begun as soon as possible. * * * It is evident that the barracuda fishery of California has increased almost steadily from 1889 to 1921. * * * The total yearly catches do not indicate any decline in the natural supply. But the evidence from the increase of the total annual catch is too deceptive to serve as a basis for a conclusion that overfishing is not taking place."

"A shifting of the fishing grounds to more distant regions is often a sign of depletion of the home supply * * *, but * * * practically all the Mexican barracuda landed in southern California are caught during the season of scarcity of local fish; during April, May, June and July, when the local barracuda fishery is most successful, hardly any boats go to Mexico for their fish."

"There is, however, among the more intelligent barracuda fishermen and fish dealers at San Pedro, a very strong feeling amounting to conviction that the toll taken from the supply even now is too heavy and that the stock begins to show decided indications of decrease."

As is indicated in the report, the purse-seine fishermen can not be blamed with the possible existence of overfishing, any more than other gears can, such as the gill-netters, which take such great quantities of barracuda when spawning, and the roundhaul netters which operate in much the same way and with the same effect as the purse seiners. It is probably true that during the months of March and April large catches of undersized barracuda are taken by purse seiners. Dr. Skogsberg was unable to witness any of these and he believes them relatively seldom made. He points out that the question as to the relative value of these small fish in the conservation of the species is entirely unknown. In the great fisheries of Europe enormous quantities of very young plaice, cod, haddock, etc., are taken and marketed, and have been for a great many years. Almost every great fishery, in fact, is wasteful, as witness the halibut fishery in the north Pacific, where more fish are destroyed than are taken.

Furthermore, the fate of these young fish after being caught and liberated is unknown. The author is assured that, when not over-

crowded in the net, they survive. But when taken in too great numbers, or gilled in the meshes, they are undoubtedly seriously injured. He, therefore, believes that it would be a mistake to force the fishermen to use large meshes, but that, on the contrary, they should be allowed to use meshes too small to permit undersized fish to gill. This is the more true in that the gilling of fish must be avoided by the purse seiners because of the labor involved, and because of damage to the nets.

The evidence shows, on the whole, that the purse seines assist in conserving our local supplies by bringing fish from Mexico, and by catching winter fish, but that they are perhaps injurious during March and April, although even that is doubtful. They are least harmful during May, June, July and August, when the gill net fishermen take great quantities of spawning barracuda. The restriction necessary should be applied with these facts in mind.

In so far as the white sea bass fishery is concerned, Dr. Skogsberg found few complaints and his opinion is that the purse seiners do no more damage than do others. The proportion of small fish taken is not great, nor is there any feeling that depletion is occurring. About half of the total catch is taken by the purse seiners, and during the winter months as high as 98 per cent is landed by them. They do not bring, however, any great amount of Mexican white sea bass into Los Angeles Harbor. The same remarks apply to the yellowtail fishery, although in that case he calls attention to the fact that the great demand in 1918 demonstrated the rich possibilities of the fishery and conclusively showed the lack of overfishing in the following years.

The bluefin fishery shows no evidence of harmful fishing. "The decline in the bluefin fishery during the last two years may, to some extent, be explained by the low market prices, the possibly increased difficulties of catching the fish and the decrease in the number of the operating purse seine boats. The small number of years (six) during which the bluefin tuna fishery has been carried on, the shortness of the fishing season and the suddenness of the decline make it very improbable that the failure in 1921 and 1922 was caused by overfishing during the two preceding years."

One may summarize Dr. Skogsberg's findings by saying that the purse seines are on the whole no more harmful than other types of gear, and that their activities during the month of April, when they take great quantities of the smaller barracuda may be restricted by proper regulations. He also brings forward evidence showing that they are necessary types of vessels in tapping distant reserves of fish, thus relieving the strain upon our local supplies; that they provide the greater part of our winter supply of fresh fish, and that the whole of the bluefin tuna catch depends upon them. They are less harmful than beneficial, in so far as the conservation of our fisheries is concerned.

From an economic standpoint they meet with several objections, only one of which is dealt with in detail. This, the fluctuations in supply, and the resulting fluctuation in price, is disastrous to both the purse seiners and other fishermen, and is a defect inherent in any method of fishing which makes large individual catches. The correct method of dealing with this, the author and reviewers believe, is by the encouragement of cold storage facilities. The elimination of these fluctuations

would remove one of the prime causes of dislike among fishermen for this method of fishing.

The other causes of feeling against the purse seiners may be briefly enumerated, although not all dealt with in the report. There is the usual resentment of fishermen against new fishing methods, the uneasy feeling as to the permanence of supply that is generated in the layman's mind when he sees great individual catches of a species landed, the invasion by the purse seiners of districts reserved by law for the use of the sportsmen, and the fear that the nets in dragging the bottom destroy fish eggs and food. These things can not be dealt with here, although Dr. Skogsberg clearly shows that the latter cause of dislike is not justifiable.

The recommendations as to legislation suitable indicate that a close season during April and May would be effective in preventing the damage to small barracuda, which is the chief cause for the agitation against the purse seiners. Other measures possible and proposed are also discussed, and dismissed. A warning is sounded, that measures seriously injuring the purse seines will simply lead to the great development of the round-haul fishermen, who are indispensable in the sardine industry, but whose nets operate in the same general way and with the same damage to young fish as the purse seines.

The reviewers wish to emphasize Dr. Skogsberg's conclusion that there are a great many questions of a scientific nature still to be attacked before really final conclusions are reached with regard to the condition of our fish supply.

THE BAND-TAILED PIGEON IN YOSEMITE.

By M. Hall McAllister.

Thanks to the national parks and other game reserves where man, the great destroyer, can not get in his deadly work, our game birds and animals have a chance of surviving and becoming an asset for future generations. If fifty or one hundred years ago there had been throughout the Eastern States such game reserves, the now extinct passenger pigeon would still be in existence.

A great variety of birds and animals make their homes in places like Yosemite National Park. Some may be seen in broad daylight, others only at night. When visiting Yosemite it is a good rule, if you wish to see some interesting sights, to get up about a half hour before daylight, say 3.30 a.m. in June or July, and you will find a number of early folk to greet you. Some birds and animals appear at the first streak of dawn and disappear about 6 a.m., as soon as there is the least stir among the camps or dwellings. Visit the horse corrals which are along the north wall, east of Yosemite Falls, and you will probably find a flock of several hundred band-tails feeding there. Bands of deer may be seen in the meadows and glimpses of the furry tribe, including flying squirrels and weasels, may be enjoyed.

The band-tailed pigeon, a wild pigeon of Western States, is found in California the year round. It appears to be increasing in numbers, due to federal and state protection. In the Yosemite Valley pigeons are abundant and may be easily seen by visitors, provided they know how and where to look for them.

These flocks of wild pigeons seek the seclusion of the high trees on the walls of the valley during the day and, therefore, are but seldom seen by the daily visitors. A favorite habitat is on the tall cliff overlooking Vernal Fall on the south and occasionally a small flock can be seen as they are picking up grain on the road which follows the foot of the talus just under Sentinel Rock. This bird feeds largely on acorns, of which there is a plentiful supply.

During the winter months these pigeons do not leave the valley unless the storms are very prolonged, and then they apparently go a few miles down the Merced River canyon, but shortly return to their old haunt.

A very curious sight is sometimes seen during the winter. A large flock of band-tails may be roosting in a tree, when a heavy snowfall comes, which frequently continues all night without a breath of wind. This completely covers the perching birds and in the morning, when they are suddenly disturbed by a passerby, out they fly, causing a novel shower of snow.

The snowfall in the Yosemite is a remarkable feature of this attractive place. John Muir first called attention to the fact that the valley, or great gorge, which it really is, runs east and west, while the strong storm winds blow north and south. Therefore, while a hurricane blizzard may be piling up the snow on the heights, the fall in the valley comes down as gently as if it were at the bottom of a well. And so a heavy mantle of snow is particularly beautiful as it descends with but little wind and sticks fast to the trees and other objects, including, perhaps, a slumbering flock of pigeons.

Band-tailed pigeons are now breeding in various locations in the park. Their nests can be seen on the high cliffs overlooking Vernal Fall and among the pine and oak trees on the walls of the valley. It is a great satisfaction to know that these splendid birds have made their home in a protected area where they are safe for all time.

WHY CANADA AND THE UNITED STATES COMBINED TO STOP SPRING SHOOTING.*

By J. H. Fleming.

So much has been written about bird protection from the extreme point of view of the reformer that many men of moderate views have got the idea that protection spells total prohibition of shooting, instead of what it really means, the prevention of extermination, and the building up of the reserves of wild life to a point when the sportsman may feel that his future as a sportsman is safe under the regulations of the Migratory Birds Convention Act; while the same law acts as a check on the decrease of the nongame bird population of our country as well.

The extermination of wild life is not by any means confined to North America, it has been world wide, but possibly the results have been more clearly foreseen in Canada and the United States, and early enough to give hopes that with unity of legislation the word *exterminated* need only be written against a few of the birds and animals now in real danger of disappearing. And it is just in this lack of unity of laws (the question of enforcement is another matter) that Canada's efforts to restore the balance of nature by protective legislation is in danger. Animals are not subject to the impulse of migration to anything like the same extent as are birds. Provincial legislation is usually effective in their case, but local legislation for birds has repeatedly proved in the past to be ineffective as a protective measure. Birds pass from province to province and even from continent to continent in their journeys, and they suffer from local conditions as well as from international.

We in Canada are fortunate in that continental legislation is likely to prove a decisive factor in checking the downward movement of many desirable birds, but we must be unanimous, every province should legislate in conformity with the Migratory Birds Convention Act of the federal government of Canada if results adequate to the necessity of the case are to be obtained, and the case is urgent. We are not yet on the road to safety for our birds till every province conforms to the federal act. When that does happen we may then look to the United States to act with us, and we may then hope for the continental enforcement of an act that means results, both to the birds and to the sportsman, results that are bound to be beneficial to both. The convention is not the result of hasty legislation, but the carefully thought out effort of men who have seen the disheartening failure of laws that are purely local, and who know that nothing short of joint action by both the United States and Canada can be effective in building up the reserve of our bird life.

Migratory game birds such as ducks and geese may appear at times to be abundant in some one place, and the natural inference is that they are not decreasing, but the observer overlooks the fact that the old feeding grounds are not now as extensive, particularly in the West, as they used to be, and the birds are crowded into a smaller area. There have been many reasons given for the decrease of game birds. Spring shooting has harried them on migration and consequently they reach

*Leaflet published by Commissioner, Dominion Parks Branch, Ottawa, Canada.

their breeding grounds with less vitality than they ought, and they are apt to select the safest breeding grounds and often not the best. Many birds become barren and never reach the breeding grounds at all in consequence of the persecution they have experienced on their northern journey, and it is here that the direct benefits of the Migratory Birds Convention Act will be quickly felt. The birds will arrive in their full numbers and vigor and will select the most suitable breeding grounds, and in consequence the breeding range will be more extended and then, if granted sufficient local protection, there is no reason why there should not be a considerable increase in our migratory game within a few years, but we must give ample protection during the breeding season and local legislation has not in the past done this. It is only by joint action of the United States and Canada that protection over the whole breeding range of many species can be effective. The decrease of migratory game is so apparent that it is a matter of general knowledge, and fortunately the means to check it has at last come to our hands if we will only sink our local differences and accept the guidance of a central and well informed body whose duty it is to administer the treaty on behalf of Canada.

CALIFORNIA FISH AND GAME.

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October 10, 1923.

"The undoubted solution of the conservation problem is education, particularly of the young. Police methods, however, seem the sole means of controlling the hardened offender."

THE MOST NEEDED THING IN GAME CONSERVATION.

Fish and game administration is not a new thing. California has had a Fish and Game Commission, charged with care of the wild life resources, since 1870. Yet fundamental data that would be most useful in determining what toll can be taken of the various species has not been obtained. No one knows the average age of deer nor the natural death rate. Very little is known regarding the factors concerned in the increase or decrease of a species. Too often, emphasis is placed upon one factor alone, as, for instance, the predatory animals, when, in reality, there may be a multiplicity of factors concerned. Until we have dependable statistics as to the natural rate of increase and the normal death rate, it will be impossible scientifically to administer wild life resources. The most important data obtained in recent years has been that regarding the toll taken by the hunter. Several states now require every hunter to report his kill, and compilations are available showing the number of big game animals killed annually. How large a toll can be safely taken and still leave a sufficient breeding stock is still a matter of speculation. The most needed thing in game conservation is an intensive study of rate of increase and the death rate together with those factors concerned with these phenomena.

KLAMATH RIVER POWER PROJECT HEARING.

The hearing of the application of the Electro-Metals Company was continued before the Division of Water Rights the first of May, R. D. Duke, representing the Fish and Game Commission, one of the protestants. The appropriation was made by Carl Langford in 1908 of 500,000 inches of water flowing in the Klamath River or over four times the mean flow of the Klamath. The point of diversion was Ishi Pishi Falls, Siskiyou County. This appropriation was for the purpose of developing hydro-electric power for use in the reduction of ores in the production of aluminum.

The application of the Electro-Metals Company is for the purpose of having the time extended for a period of ten years within which to complete its proposed development and in order to justify the Division of Water Rights in granting such extension, it is incumbent upon the applicant under section 12 of the Water Act, that "the appropriator or user shall have proceeded with due diligence in proportion to the magnitude of the project."

At the time the appropriation was made there were no trails or roads, the nearest road being twenty-two miles or as far as Martin's Ferry in from the coast, and all materials had to be brought in on pack animals.

No roads were built by the appropriator and the only work done towards putting to a beneficial use this vast appropriation of water, outside of some surveying, was to bore a tunnel 1700 feet long, as yet incomplete. The original plan was to divert the water through this tunnel and through a canal to the proposed power plant below Ishi Pishi Falls, but since then, the appropriators have changed their plans and propose to construct a dam 250 feet high which would close the streams to the passage of salmon and sea-run trout and thus destroy this last large run of these species of fish in this state.

The state owns and operates a fish hatchery on Fall Creek, a tributary of the Klamath River, and an egg taking station at Klamathon where annually an average of five million sea-run trout eggs and twenty million salmon eggs, which are used not only for stocking the Klamath, but also other streams. If this permit is granted it means the end of this source of supply and the practical confiscation of the property of the state as it would become useless.

The Fish and Game Commission is protesting on the ground that this is the

last large run of salmon and sea-run trout in California for over ninety per cent of the spawning grounds have been destroyed by the hydro-electric power development, particularly on the Sacramento and San Joaquin rivers, and the only object of the Fish and Game Commission in protesting is to save these fish for the purpose of propagation and from extermination.

The government has constructed a road down the Klamath River which for miles runs through a forest reserve and is going to be one of the scenic trips of the state, the principal attraction of which is fish and game.

The application of the appropriator shows the power is to be used to develop a private enterprise in the manufacturing of aluminum and it does not seem possible that the time has come in this state when the people will suffer the last large run of salmon and sea-run trout to be absolutely destroyed by a private greed.

FIG. 26. A tame sooty grouse, Scott's Valley, Siskiyou County. Photographed April 24, 1923, by A. E. Culver.

BUREAU OF FISHERIES SUPPORTS COMMISSION'S STAND ON KLAMATH POWER PROJECT.

The following letter from Commissioner of Fisheries Henry OMalley supports the stand of the California Fish and Game Commission as to the feasibility of a fishway over a two hundred foot dam:

MR. W. H. SHEBLEY,

In charge, Department of Fish Culture, Fish and Game Commission of California, Sacramento, Cal.

DEAR MR. SHEBLEY:

I acknowledge the receipt of your letter of March 27 and note that your Commission is endeavoring to amend the present fishway law of California so as to enable the Commission to use its judgment in regard to establishing hatcheries in lieu of fishways when in their judgment the dams are placed too near the mouths of the rivers, so that salmon can not properly mature their eggs when intercepted that low down on the river.

I further note that a statement has been made to the effect that the Bureau, or I, have approved of a fishway proposed by the Electro-Metals Co. I want to say to you very decidedly that I have not approved any type of fishway. I have consistently adhered to the statement that it is practically impossible successfully to pass adult salmon over a dam or obstruction of a greater height than 30 feet. There are one or two instances where they do go over a dam higher than this, but the cases are rare, and none of them exceed 40 feet.

The dam of the Portland Railway, Light and Power Company, located at River Mill, Oregon, is something over 100 feet in height, if I recall the figures correctly, and to my personal knowledge, borne out by the statements of Mr. Mitchell, our superintendent at Clackamas, Oregon, station, we have never known a salmon to successfully negotiate the fishway. During the season when we are operating for eggs below the dam we do not even take the trouble, in recent years, to blockade the fishway because it presents a sufficient barrier in itself. This fishway was constructed by the Portland Railway, Light and Power Company in good faith and from the best plans available at that time, but it has not proven a success.

The proposal of the Electro-Metals Co. to construct a fishway in rises of 30 or 40 feet, and then establish small lakes or resting pools is an entirely new plan, and it would be impossible for me to state whether or not it would prove successful, but I would not want to recommend it for a river which is supporting a commercial run of salmon that would be destroyed if it were not to prove successful. It seems to me that it should first be attempted on some unimportant stream to find out whether the plan would be practicable.

We have one or two men in the Bureau who are studying fishways with the idea of attempting to develop something that is practical for the high dams which are under contemplation at various points, but up to the present time nothing that approaches a satisfactory device has been suggested.

If you desire to use this letter officially, you may do so, and I shall be glad to give you any other information which we have available at the Bureau.

Very truly yours,

HENRY O'MALLEY,
Commissioner.

IN MEMORIAM.

WILLARD ODION FASSETT.

Willard Odion Fassett departed this life April 10, 1923. He was a son of the late Thomas Odion Fassett, U. S. N., and Susan Knight Fassett. He was born April 4, 1862 at Brooklyn, New York, and came to San Francisco with his parents in 1867. Later the family moved to Vallejo.

Mr. Fassett graduated from the Vallejo High School in 1879. Shortly after this he entered the service of the United States Navy as a machinist apprentice in the steam engineering department at Mare Island, where he completed his apprenticeship and was employed for a number of years at the trade in the government service. He was a lover of nature and the great out-of-doors had a fascination for him.

He entered the employ of the California Fish and Game Commission as an apprentice fish culturist in 1896 at the Battle Creek salmon cultural station. Thereafter he took an active part in all departments of fish cultural operations, having been employed as foreman of the Commission's egg collecting station at Verdi, Nevada, as foreman and assistant in fish cultural operations under E. W. Hunt at the Tahoe stations, and as messenger in distribution work and other capacities at the Sisson hatchery, Klamath River stations and other hatcheries and egg collecting stations. Mr. Fassett was appointed superintendent of the Price Creek Hatchery in Humboldt County in 1900, where he was in charge during all the years that this station was in operation. It was a hard station to operate

W. O. FASSETT.

owing to the friable nature of the soil through which Price Creek flowed forming immense deposits of earthy matter in the water supply that caused many days and nights of anxiety on his part lest the fish and eggs in his charge be destroyed.

When the Price Creek Hatchery was abandoned in 1915 and the new hatchery near Ft. Seward established, Mr. Fassett was placed in charge of the new station. In 1920 Mr. Fassett was placed in charge of the northwestern division of the Fish and Game Commission's fish cultural operations, which included all the stations in Mendocino and Humboldt counties, consisting of Ft. Seward Hatchery, Ukiah Hatchery, Snow Mountain Egg Collecting Station and the experimental station near Branscomb on the South Fork of the Eel River. Mr. Fassett continued in charge of these stations until the date of his demise.

Mr. Fassett was a loyal and faithful employee of the Fish and Game Commission. He never neglected the most exacting duties connected with his work, always having in mind the success of his undertakings. His knowledge of the natural history of the different species of fishes that he handled in his work was of great value to him and assisted greatly in the success that he made of his fish cultural work. His mechanical training was of great assistance in the construction work at the different stations that were under his charge. Untiring in his efforts in all lines of fish culture, conscientious and dependable at all times, he was one of the old, faithful employees of the Fish and Game Commission, who made the work of the Commission known all over the country for its efficiency.

Mr. Fassett was married to Mary E. Weymouth in San Francisco, September 3, 1899. He leaves to mourn his loss his wife, one son, Weymouth Fassett, two brothers, Thomas and Philip Fassett of San Francisco, besides a host of friends, for his genial nature, generous disposition and his charity toward all men made him loved and respected by all who knew him.

In the passing of Willard Fassett the state has lost a good citizen, his wife and son a kind and loving husband and father and the Commission a dependable and faithful employee. W. H. S.

THE STEINHART AQUARIUM.

It is gratifying to the Commission, and will doubtless be of much interest to our readers, to know that the splendid new Steinhart Aquarium in Golden Gate Park, San Francisco, is to contain a demonstration hatchery for use by the California Fish and Game Commission. Ever since its organization in 1870, the Commission has been very active in introducing new species of fish suited to various local conditions, and in the artificial propagation on a large scale, of both the introduced and the most desirable native species of food and game fishes. Valuable scientific studies in the life histories of many species and in the problems of conservation and propagation have been conducted by the departments of commercial fisheries and fishculture in this connection. Some of the most important of these investigations are now in progress. The purpose of all such activities is to perpetuate and to increase the value of California fisheries, as well as to meet the demands of an increasing population of anglers for the delectable sport of fishing. Results of the Commission's efforts along this line have been probably the most successful ever recorded by any state in the Union.

This miniature hatchery in the aquarium is to be well equipped for showing all of the processes, methods and practices used in the artificial hatching and rearing of fish. The Fish and Game Commission expects to cooperate by detailing one of its fishcultural experts to take charge during appropriate seasons and to give information. It is anticipated that this feature of the aquarium will be much enjoyed and appreciated by the thousands of persons who will visit the numerous exhibits.

A biological laboratory, equipped so that investigators, professors, high school teachers and others may come and study any problems in which they are interested and which can be studied with aquarium material, is also a part of the aquarium plan. This offers a resource of much value to teachers and their students and one which it is hoped will be widely used.

We are pleased to present the following description of the aquarium and a brief history of this gift to California:

"Construction work on this aquarium, which was begun in April, 1922, will probably be completed early in July. The California Academy of Sciences has already begun collecting and placing in the tanks and pools the fishes and other aquatic animals that will constitute the permanent exhibits. There are in the stock tanks now, quite a number of aquatic animals of various kinds including one small California sea lion, one horseshoe crab, some thirty turtles, representing eight different species from Lake

Maxinkuckee, Indiana, and numerous aquatic reptiles and amphibians from the states of Washington and Texas, including a three-foot alligator from the latter state. To assemble and install the exhibits necessary fully to stock the aquarium will require a month or longer, but it is hoped that the installations will all be completed and the aquarium ready to open to the public within a few months.

"There are 57 large tanks, about 40 smaller balanced aquariums or tanks, one large indoor tropical swamp, and five large outdoor pools for sea lions, fur seals, leopard seals, porpoises and fishes too large to put in the indoor tanks. Both fresh water and salt water fishes will be shown. Four kinds of water will be used. There will be tanks with fresh water of the local temperature for local fresh water fishes, and others with fresh water cooled to suit trout, salmon and other cold water species. Then there will be other tanks with salt water of the local temperature for the salt water species of our coast, and other tanks with water heated to suit the gorgeously colored tropical fishes from the Hawaiian Islands. About a dozen large tanks will be devoted to tropical species.

"The indoor tropical swamp is the first thing that will attract the attention of the visitor as he enters the building. This swamp is on the main floor and is about 25 by 45 feet. The side opposite the visitor will be a moss-covered bank down which water trickles gently and artistically. At the other side the water will be two or three feet deep. Lying about in the swamp will be several old moss-covered logs, stumps and rocks on which turtles, watersnakes, frogs and salamanders can crawl out. And there will be aquatic plants of various kinds growing in the swamp, while ferns, climbing vines and other suitable plants will cover the walls to a height of 30 to 40 feet on three sides of the swamp, and from the skylight girders above the swamp will be suspended orchids and other beautiful tropical epiphytes.

"In the 57 large aquariums and the 40 or more smaller ones it is hoped to show a great many of the most interesting and important fishes found on the west coast of America and in the Hawaiian Islands, as well as many kinds from other countries. It is also the intention to show as many species of turtles, watersnakes, frogs and salamanders as possible, including the water-dog from the Great Lakes, the alligator snapper from Arkansas, and that strange animal from the Mississippi River, the hellbender, or, to speak more reverently, the "sheol curver."

"For this great educational institution, San Francisco, the Bay region and the entire state are indebted to Ignatz Steinhart, banker and philanthropist of San Francisco, who died May 15, 1917. In his will Mr. Steinhart left $250,000 to the California Academy of Sciences for a public aquarium on condition that it be located in Golden Gate Park adjoining the Museum of the California Academy of Sciences and the 'management, superintendence and operation be in charge and under the direction of the California Academy of Sciences.'

"The executors, Mr. Jesse W. Lilienthal, Jr., and Mr. John I. Walter, paid over to the Academy the full $250,000 in one check in December, 1919, and the trustees of the Academy loaned the entire amount on the day it was received at a good rate, the interest payable monthly. Whenever an interest payment was received the amount was invested in government certificates, with the result that more than $53,000 interest has already accrued.

"Mr. Steinhart originally planned to put $75,000 to $125,000 into the aquarium building and its equipment. But the larger amount named in his will and the business-like handling of the money by the board of trustees of the Academy has made it possible to put $303,000 into it, and to provide a very much larger, better equipped and more beautiful aquarium than was originally contemplated or possible.

"Dr. Barton Warren Evermann, the director of the museum of the California Academy of Sciences will also be the director of the Steinhart Aquarium, and Mr. Alvin Seale, director of the Manila Aquarium for several years, will be superintendent and in immediate charge.

"Mr. Steinhart had for several years contemplated establishing a public aquarium but finally practically abandoned the idea until Dr. Evermann had an interview with him on March 8, 1916, at which time Mr. Steinhart said that he had met with so many difficulties of one sort or another that he had abandoned the aquarium idea and had about decided to devote the money to another and entirely different purpose. Dr. Evermann left him that evening with the feeling that there was no hope of Mr. Steinhart ever giving any money for a public aquarium. But two days later Mr. Steinhart telephoned Dr. Evermann to come and take luncheon with him at the California

Market. The invitation was, of course, accepted and almost the sole subject of conversation during the luncheon was aquariums. Other luncheons followed at rather close intervals. On April 5th, Mr. Steinhart stated to Dr. Evermann that he had finally decided to establish an aquarium in Golden Gate Park and under the California Academy of Sciences, and on September 13, 1916, at an aquarium luncheon held at the Palace Hotel, at which Mr. E. O. McCormick presided, Mr. Steinhart made the first public announcement of his decision.

"From that date the matter moved rapidly. A charter amendment was adopted by the city and county of San Francisco which authorizes and directs the board of supervisors to provide in the budget and to pay over to the Academy of Sciences the funds annually required for the maintenance of the aquarium.

"San Francisco and the entire state are to be congratulated on the prospect of early completion of such a useful educational institution as the Steinhart Aquarium is sure to be. What a fine thing it was for Mr. Steinhart to make this possible! What a splendid and enduring memorial the Steinhart Aquarium will be! The name of Ignatz Steinhart will ever be held in grateful remembrance."

IT ALL HELPS.

Although we many times hear of readers of CALIFORNIA FISH AND GAME who pass on their copy of the magazine to others to read, it has been seldom that we have met the enthusiasm shown by a motorman of San Francisco who recently stated that upon the receipt of CALIFORNIA FISH AND GAME he reads it from cover to cover, allows his wife to read it, and then his son. After home consumption, he sends it to a teacher in a country school in northern California with the request that it be returned. Upon its return, by this time rather worn and soiled, it is finally forwarded to a friend in Michigan.

Successive attempts to eliminate a large number of those receiving the magazine and consigning it to the wastebasket have shown that 96 per cent of our readers actually read the magazine and invariably find and return the postal card which assures their continuance on the mailing list.

HAWK AND OWL BOUNTIES.

In a leading editorial, "Evils that Lurk in the Bounty System," *Bird-Lore*, Vol. XXV, No. 2, March-April, 1923, makes a strong appeal for discrimination between the harmful and the beneficial species of birds where bounty laws are in operation or are being advocated. It is pointed out that for many years it has been the custom in western Europe to employ keepers, for the private game preserves, whose duty it is to destroy birds or animals which prey upon the game within the preserves. Such birds or animals are usually classed as "vermin," and include hawks, owls, rooks or any bird which is thought to be destructive to game.

This custom is also in more or less general practice in this country and its influence is seen in the agitation for "bounty laws" in various state legislatures. Some states have such laws in operation, as for instance, Virginia, which pays a cash reward on hawks, owls and crows. Of course, it is but natural that these birds were indiscriminately condemned in Europe a century ago because scientific investigation had not then determined the food habits of the different species. Now, however, through studies made by the United States Department of Agriculture, Bureau of Biological Survey, it has been found that really a small minority of these birds prey upon game birds. Of the 19 species of hawks and 21 species of owls in North America, the sharp-shinned hawk, Cooper's hawk, goshawk (not abundant), the great horned owl and the snowy owl are the serious offenders. The Biological Survey has gone on record as not approving the bounty system, but even if it were considered a good thing for really destructive birds or animals, why should public money be paid for the killing of the many species of hawks and owls that live almost entirely upon grasshoppers, mice, rats, gophers and other pests that work havoc upon the crops of the farmer and orchardist.

The bald eagle, emblem of American independence, is also among the unprotected birds in some states. In Alaska, where the eagle is very abundant, it is stated that more than 18,000 eagle bounties have been paid. If we must have bounty systems, why can not the bounties be confined to the birds that have been proven to be detrimental to game or insectivorous birds. With all of the literature available on the subject, there is no reason why anyone should not be informed as to the harmful and beneficial species. Bounties, if paid at all, should be paid only on the undesirables.

GAME LAW ABSTRACTS.

It has been the custom of sporting goods houses to issue small cards giving an abstract of the game laws. In order to have these cards ready for the angling season they are rushed through before an authentic synopsis of the new laws has been made by the Fish and Game Commission. As a result, serious mistakes are made and the Commission has the greater difficulty in law enforcement. Several new laws were placed upon the statute books by the 1923 legislature and every sporting goods house planning a game card should obtain an official tabulation from the Fish and Game Commission.

RABBIT HUNTING AND QUAIL.

Southern California is greatly disturbed over the quail situation. In the early days, the valley quail was a very abundant bird, but the species seems to be disappearing all through the southern counties. Doubtless, there are many causes for this decrease, the destruction of food and shelter being, perhaps, the prime cause. Among the minor factors concerned may be pointed out the situation which southern California still maintains as regards rabbits. Although northern California some years ago gave protection to the rabbit so as to give no excuse to anyone to have a gun in the field before the opening of the quail season, southern California, on the other hand, has persistently requested no protection for rabbits on the plea that they were very destructive to crops. As a result, law enforcement has been difficult and the alien gunner, with the constant excuse of "hunting rabbits," has been able to kill quail out of season. On the statute books the rabbit continues to hold a unique position—in one section it is branded a destructive animal and given no limit, yet in another section limit laws hold and sentiment favors protection.

FIG. 27. Whistling swans feeding in rice stubble fields near Richvale, Butte County, November 19, 1922. These birds were particularly abundant in the Sacramento Valley last winter. Photograph by George Thompson.

VIOLATORS MOSTLY FOREIGNERS.

Scan the list of game law violators and it will be found that a very large percentage of them are foreigners. In fact, 75 per cent of the violations are either willful evasions by aliens or are traceable to ignorance. The most effective remedies are an alien gun law and education. These measures would greatly aid law enforcement and effectually reduce violations.

An educational program has been adopted in California but the alien gun law, found so useful in other states, is not to be found on our statute books.

STRIPED BASS IN OAKLAND LAKE.

During early March, while dredging operations were in progress at Lake Merritt, Oakland, the gates which govern the tidewater used in forming the lake were closed for a time. A large number of striped bass which had found their way into the lake from the creek were shut off from exit and soon sickened in the brackish water of the lake. Fishing for them was popular at first, but those taken were unfit for food and, therefore, at the suggestion of the Board of Health, all permits for fishing were rescinded. Fish of four or five pounds in weight were taken.

DO NOT MOLEST FAWNS.

The formal opening of the vacation season in California was celebrated with the opening of the trout season, and mountains and woods and streams extend their invitations. Camp outfits have been assembled and the exodus to the great out-of-doors has begun; daily this movement gathers impetus, and in but a short space of time tourists will have taken possession of all of the favorite campsites in the whole mountain area of California.

The deer, too, are now leaving their winter quarters in the sheltered places below the winter snow line and are following the receding snows to the higher altitudes where they will take up their summer homes. And, arriving on the summer range, the deer family will set up the manner of housekeeping that is peculiar to their kind.

Male deer all shed their horns during the winter and the principal business of the buck during the summer is to grow another set of antlers that may adorn some hunter's den this year, or be the foundation for some of the stories that only a deer-hunter knows how to tell. The older bucks soon leave the other deer and seek solitude in the high inaccessible mountain regions where they stay until after the opening of the deer season, and the coming of the hunter.

Does and yearlings remain in the little mountain valleys and glades and along the streams and near lakes. It is here that the fawns are born, each doe raising one or two; protection and conservation of the yearly 'crop' of fawns is absolutely necessary if the sport of deer hunting is to be perpetuated.

For the first few days after the fawn is born the mother deer will place her baby in some secluded spot where it will lie and sleep most of the time—the mother deer will go away, but will return to feed her baby periodically. The tourist wandering through the woods, or the angler along the stream may, perchance, happen upon a newly-born fawn. Immediately he is intensely fascinated at the sight of the little fellow, for while the young of all wild animals are attractive, none is more beautiful than the fawn. The little warm ball of soft, spotted fur, the small slender nose, the restive ears and the large wistful eyes are irresistible attractions; and many a person after gazing on this beautiful creature is possessed by the desire to have—and to hold. However, the law injects itself at this point and says specifically that every person who takes or has in his possession any spotted fawn is guilty of a misdemeanor, and upon conviction, shall be fined in a sum of not less than $50, or sentenced to jail, or both.

While occasionally a fawn may be left an orphan, such instances are rare. A very young fawn may appear to be "half-starved," but such is not the case and the youngster soon acquires sufficient strength to accompany the mother. Provision is made by Mother Nature to protect the little fawn from predatory animals for the scent sacs are not developed for a number of days after the fawn is born; during which period a good deer dog may pass within a few feet of a fawn without being aware of its presence, as there is no scent.

From time to time, certain well meaning but misguided persons will pick up a little fawn discovered in the woods believing it to be abandoned because the mother deer does not happen to be in sight at the moment, and such person will then write to the Fish and Game Commission for a permit to keep the animal. This can not be granted.

While on your trip to the mountains, should you be so fortunate as to see a young fawn you should appreciate your privilege to look upon one of Nature's most wonderful creatures, and you should be grateful and go away without disturbing the little animal. Reducing any deer to captivity is not desirable as most people soon tire of a deer as a pet, for the affections of an adult deer are decidedly fickle. But when the animal has once been kept a captive it can not be liberated again for it has lost its fear of man and can no longer take care of itself; thus, the deer which has been picked up as a little fawn must be retained in captivity all of its life; which is certainly an ignominious existence for so noble an animal.—Roy Ludlum, Sacramento, California.

A WARNING.

After every session of the legislature, hunters and anglers find themselves in serious trouble owing to the fact that they have not secured correct information regarding new laws passed. The newspapers, in reporting new laws passed by the legislature and signed by the Governor, do not explain that these laws do not go into effect until 90 days after the close of the legislature, which this year ended May 18th. In spite of statements to the contrary, the trout limit remains the same and relatively few changes in laws went into effect on August 17th.

this game bird. That a real toll is annually being taken of the predatory species is evidenced by the accompanying photograph which shows the results of the 1922 season. In all, 120 animals were taken, as follows: coyotes, 10; cats, 24; coons, 16; foxes, 4; opossums, 20; skunks, 38; civet cats, 5; squirrels, 3.

Last year on an area of 10¼ square miles, 84 predatory animals were secured. Attention is called to the large number of opossums, which demonstrates the fact that this is now a common animal on the peninsula, although introduced into this state as recently as 1910.

FIG. 28. Catch of fur-bearing mammals on the Spring Valley Water Company property in San Mateo County, season 1922–23. One hundred twenty pelts in all. Note the twenty opossum skins. Courtesy Spring Valley Water Company.

WATER COMPANY DESTROYS PREDATORY ANIMALS.

The Spring Valley Water Company has been doing systematic trapping on its properties in northern San Mateo County for several years past. This constitutes an interesting trial of the much vaunted value of the control of predatory animals as a means of increasing game, for no hunting is allowed on the properties and there should be an opportunity to determine what relations exist between the predatory animals and game.

Valley quail were once very numerous, and the trapping operations have been instituted largely as a means of increasing

A DEFENSE OF THE COYOTE.

In eastern Oregon, where the coyote has been hunted by federal officials for the past several years, the jackrabbit has grown so abundant that since 1911 it has taken at least 10 per cent of all the crops suited to its food habits. This applies, of course, to the sections along the stock growing belts where alfalfa is the chief forage crop.

In 1911, I began to take the matter up with the federal authorities, and was told that an epidemic would soon give us all the relief we could ask for. There were two slight "waves," when the rabbits were somewhat reduced in numbers, but

they were back to normal within a year each time. Ground squirrels were nearly as numerous as the rabbits, but did not destroy as much because of the fact that they do not work all year.

As for the damage done by the coyote, I believe that it is not nearly as great as is claimed, and this seems also to be the opinion of some stockmen. The manager of one of the largest sheep outfits in the world has stated to the writer that the coyote is responsible for some 8 per cent of the losses among sheep. He also said that the greater part of this loss was sustained during May, the breeding season of the coyote, and that if the herders would take better care of their flocks, much of this loss could be avoided. I have several times found, in cases where heavy losses were being claimed, that the sheep were bedded down in an exposed situation, with the herders and the dogs sleeping a mile or more away from their charges. This gave the coyote ample opportunity to help himself.

The killing off of the rabbits by poisoning has been a total failure in the section where I took my notes, although it was tried several times. I am convinced that the best check is the coyote, which Nature has placed there to keep down just such pests. I hold no particular friendship for the coyote and am willing to admit that in some parts of the country it should be reduced or driven out; but in the above mentioned locality, as well as in other sections of the northwest where the rabbits and ground squirrels are the greater pest, I have no doubt that the coyote is the rancher's best friend and that many of them so regard it. Its killing is a double tax on the country and I do not understand why it is not looked upon in this way by the government.—A. W. Anthony, San Diego, California.

THE FUTURE OF ANGLING IN THE SAN JOAQUIN.

The power companies which are responsible for the great dams which keep fish from reaching their spawning grounds have in a measure compensated for the reduced run of fish by building roads which form the only means of access for anglers and have taken pains to stock newly completed reservoirs. The following letter from the managing director of the San Joaquin Light and Power Company is typical of the interest in fish conservation usually displayed by power company officials. The picture of conditions expected with further development is of particular interest to every angler.

FRESNO, CALIFORNIA, March 29, 1923.

MR. W. H. SHEBLEY,
c/o California Fish and Game Commission, Sacramento, California.

DEAR MR. SHEBLEY:

I have just read that part of your report of 1922, relating to the history of fish-cultural operations in California—especially that part of it on pages 94 and 95 that deals with the Merced and San Joaquin rivers.

I think you stated quite rightly the situation with reference to the Merced River, but I think you have overlooked in the San Joaquin River that the Miller & Lux and the Madera people are expecting to build a dam about half a mile above the station at Friant, that will be about 280 feet high. To impound the flood waters of the San Joaquin River will at times make the river entirely dry below the dam; that is to say, such seasons of the year as the water is not being used beneficially for irrigation, it will be impounded and the dam will back the water nearly up to the Kerckhoff Power House of the San Joaquin Light and Power corporation. After that is built, I do not think I am exaggerating in saying that there will be but a short period each year when any of the water from this stream will reach the bay; not only will the river be dry from Friant to the intake of the Miller & Lux ditches, above Firebaugh, but it will be dry from there to the mouth of the Merced, and when the Merced is reservoired, from there to the mouth of the Tuolumne River, and inasmuch as the Tuolumne is already reservoired at Don Pedro, it will dry the river from there to the mouth of the Stanislaus. As there are several big plans on foot for the storage of flood waters on the Stanislaus, it looks to me as though the only water that will be in the San Joaquin will be that amount that seeps in from the irrigation of the west side, through the spongy west bank of the river. So it looks to me as though any plan to perpetuate the streams referred to as breeding grounds for salmon are doomed, for the water must either be used for irrigation or the country will become as dry as the desert of Sahara.

These large reservoirs, however, will make it possible to develop wonderful fishing grounds for other kinds of fish. In our reservoir on the North Fork of the San Joaquin River, at Crane Valley, literally thousands of people are attracted by the fishing opportunities—just as they are at Huntington Lake, on Big Fork of the San Joaquin. While we shall probably have less salmon, we shall have more bass and trout, and I hope you will make it trout, as the bass are not a satisfactory fish with which to stock our big artificial lakes. People have gone up to Crane Valley with carp minnows for bait and the carp have gotten a start that supplies much of the necessary food for the bass; they are therefore not biting nearly as well as they did a few years ago.

Large reservoirs will also be built on Kings, Kern, Kaweah and Tule rivers, but none of these streams were ever noted as salmon streams; they will, however, make additional fishing grounds for other species of fish and will be a thousand times more beneficial to the people than the streams are at the present time, at the locations of these reservoirs. We may, therefore, lose our streams as salmon breeding grounds, but we will gain millions in population by the irrigation of

what are now dry lands by the impounded waters, and their pleasure in fishing where there is an opportunity to fish, will, I think, have to compensate for the loss of the salmon.

Very truly yours,

A. G. WISHON,

Vice President and Managing Director.

RESOLUTIONS.

Among the more interesting resolutions adopted at the Ninth National Game Conference assembled at New York City, December 11 and 12, 1922, were the following:

"WHEREAS, the American Game Protective Association is a recognized national leader in game conservation; and

"WHEREAS, a number of game associations in the western states have requested advice and assistance from the American Game Protective Association in their work of game protection; be it

"*Resolved*, that a conference be called at some designated point in the western part of the United States under the auspices and direction of the American Game Protective Association for the purpose of discussing problems pertaining to the western section of the United States and the organization of state game associations throughout that country.

"*Resolved*, That the National Game Conference of the American Game Protective Association calls renewed attention to the dangers threatened by the constantly increasing pollution of our waters by turning chemicals, oils and other waste into our streams and by the discharge of oil waste from incoming ocean steamers. Wild life thereby is frequently destroyed or driven away and the public health is seriously endangered. Federal and state legislation should be promptly enacted and enforced to end this enormous abuse.

"*Resolved*, That the National Game Conference of the American Game Protective Association heartily endorses H. R. 12143 providing for the establishment of an Alaskan Game Commission to protect game, land fur-bearing animals and birds in Alaska, and for other purposes.

"*Resolved, further*, That a copy of this resolution be furnished the Secretary of Agriculture, the chairman of the Committee on the Territories in the House of Representatives and the author of the bill, the delegate from Alaska.

"*Resolved*, That the National Game Conference of the American Game Protective Association is in hearty sympathy with the movement to lessen the destruction of our fur-bearing mammals and advocates the establishment by all the states of long, annual, closed seasons on fur-bearers and the licensing of all trappers and of all dealers in raw furs.

"*Resolved*, That as the National Game Conference of the American Game Protective Association heartily approves of the regulations of the Migratory Game Treaty relating to the shipment of game by nonresident citizens, it strongly recommends to the various states to amend their laws to agree with the federal regulations so that visiting sportsmen may ship without difficulty legally killed birds."—Bulletin of the American Game Protective Association, Vol. 12, No. 2, April, 1923.

CANADA'S INTRODUCED PARTRIDGES.

Discussing the successful introduction of Hungarian partridges in the Province of Alberta, Canada, and Spokane County, Washington, a writer in *Fins, Feathers and Fur*, official bulletin of the Minnesota Game and Fish Department, says: "The following plan used by the Alberta Fish and Game Association of Calgary, Canada, should be closely followed in this state. Mr. Fred Green of Calgary, in a letter to Mr. Holland (vice president, American Game Protective Association), says: 'The results we have obtained are far beyond our fondest dreams. The birds have multiplied and spread out so that they are now found in all directions from Calgary. The first planting of 195 pairs has increased to such an extent that a full month's open shooting season is now permitted with a season bag limit of 50 birds. The successful method of planting Hungarians is as follows: Fifteen pairs were put down in a favorable locality and then a circle was drawn, the edge of which would be about four miles from where the first lot were put down. We then liberated five pairs every mile or so around this circle. Later we enlarged this policy and planted more to the north and south, knowing they would follow our streams which run east and west.'"

EARLY GAME CONDITIONS IN THE GREAT VALLEYS.

The passing of Lyman Belding, a pioneer of Stockton, and the appearance of his biography by A. K. Fisher (*The Auk*, Vol. XXXVII, pp. 33-45), has brought to light some interesting descriptions of game conditions in the early days. He settled in Stockton in 1856, and in describing conditions he says:

"Game was abundant, including elk, antelope, deer, bear, otter, quail, and waterfowl. Elk have disappeared from

the interior valleys of the state excepting a drove on the Miller and Lux Ranch of forty thousand acres in the San Joaquin Valley, and these animals are being captured and distributed to various parks. The elk of this state inhabited the tule marshes mainly, though I have seen many elk horns in the Marysville Buttes, probably left there by elk which came from the marshes of Butte Creek, and I have seen hundreds, if not thousands, of elk horns on the border of the tule swamps north of Stockton. Antelope have entirely disappeared from the Sacramento and San Joaquin valleys. I saw three in the latter valley a few miles west of Princeton in the summer of 1870 and a single one in Lower California about twenty-five miles south of Tia Juana in the spring of 1887. Deer were mostly in the mountains, with a few along the rivers where there were extensive thickets on bottom lands. They will continue to be common with proper protection.

"Beaver and otter were plentiful in the sloughs and tule marsh about Stockton. Beaver built houses on the marshes as the musk-rats do on the marshes in the prairies of the Middle West. There were several of these beaver houses within three miles of Stockton. They were on land that floated, as much of the peat land does in the tule swamps about Stockton. I shot seven beaver in one day in the flood of 1861 and 1862. I would jar the houses and watch for the cautious appearance of the occupants as they came out to ascertain the cause of the disturbance. They would approach under water to within a few feet of me, just as I had often seen muskrats do when I was a boy, and the only evidence of their presence would be a little circular wave caused by their breathing, with only the tip of their noses even with the surface of the water. The beaver about Marysville burrowed in the banks of the rivers. Beaver and otter became scarce long ago.

"I went to Marysville to reside early in October, 1862. Small game was abundant. Myriads of ducks and geese came from the north and east of the Sierras in October and November. Butte Creek attracted most of them. The wood duck was very common on Feather River and was a constant resident. It is now, as in the country generally, quite rare. The mountain plover appeared abundantly on the plains in October. At present it is apparently on the verge of extinction. There were a few deer along Feather River below Marysville and a few in the Marysville Buttes. Mountain quail came down from the mountains near Oroville and other localities on the eastern border of the valley to spend the winter."

DEER DIE IN HUMBOLDT COUNTY.

The finding of a large number of dead deer in Humboldt County has led to wide discussion as to the cause of death. Newspaper items appearing in various papers of the county have attributed death to widely different causes. Some have maintained that death was due to a lung worm, some to hemorrhagic septicemia, and still others to "scours," a form of diarrhea. It seems doubtful whether there is sufficient evidence to point out any one of these causes as the one responsible. Unless post-mortems could be made by some capable scientist familiar with diagnosis, it seems doubtful whether the matter can be definitely settled.

SHARK MEAT SOLD AS "WHITE BASS."

It is understood that considerable quantities of shark meat, said to be mostly the flesh of the cat or leopard shark, *Triakis semifasciatum*, are being sold in the San Francisco markets under the name of "White Bass." While shark meat is wholesome and quite palatable when properly prepared, it is regrettable that it is not sold under its own name. Such practices may appear to offer an immediate and unusual profit, but ultimately inure to the injury of the fish trade. The exploitation of this meat is desirable, but it should be done without misrepresentation and at a reasonable price. The prevailing price in San Francisco is said to be 15 cents per pound. Successful experiments in salting and smoking shark meat have been conducted on the Atlantic coast.—Fisheries Service Bulletin, No. 94; March 1, 1923.

GROWING ACTIVITY OF CALIFORNIA FISHERMEN ALONG MEXICAN COAST.

In Bureau of Fisheries, Document No. 939, Mr. R. A. Coleman, an agent of the Bureau, gives many facts of interest concerning the fishing operations of California boats in Mexican waters.

Since no natural boundary mark exists between the United States and Mexico, from the earliest times of which we have records that California fishermen have ignored the line and gone south for their catch. Practically all of the fish taken in southern California waters can be found off the Lower California coast in greater abundance than farther north. Apparently the fish migrate to the warmer southern waters as the season advances,

and in many cases can be taken during the entire winter season.

Very favorable conditions for fish life exist along the coast of Lower California with its continuous "fishing shelf," with water less than one hundred fathoms deep and with its shoreline deeply indented by many small bays and lagoons.

"The yellowfin tuna, the bluefin, the so-called halibut, the barracuda, the white sea bass, the black sea bass, the yellowtail, the mackerel and others are found in greater abundance south of the line than off the California coast, and all these fish spawn in these southern waters. The albacore is the only one of these groups that has not been taken south of Cedros Island.

"What has been said of the abundance of fishes is also true of crawfish, turtles and abalones. The turtle is rarely taken north of the boundary line, and the others are so nearly fished out in the waters of the United States that the catch is small."

Eighty-five per cent of the sea crawfish or spiny lobster coming into southern California is brought from Mexican waters. The amount annually imported is estimated at about 4,000,000 pounds.

Practically all of the turtles (*Chelonia agassizii*), are brought to California alive from Mexico. They are at present captured alive at San Bartolome and Magdalena Bay, but the Gulf of California will be in future the chief source of supply. Fully 5000 turtles are imported annually. A turtle cannery in San Diego Bay has two vessels bringing in turtles, and the canning of soups and steaks is increasing.

The supply of abalone in California waters being practically exhausted, the take is now confined almost entirely to the Lower California coast. A Japanese firm of San Diego controls this business in the south and has camps of from five to ten men who move from place to place getting the abalone. The product amounts to from eighty to one hundred tons of dried meats per year, valued at about $700 per ton. Before the war abalone shells were in much demand in England and on the continent, and the trade is now reviving somewhat. At present the imports amount to from twenty to twenty-five tons only per year valued at $60 to $120 per ton. "Blister pearls" of considerable value are occasionally found.

As early as 1888 J. W. Collins in a report to the Commissioner of Fisheries, U. S. Commission of Fish and Fisheries, speaking of the fishing in San Diego County, mentions that fishermen go from 200 to 300 miles along the southern coast for bonito and barracuda, but it was not until about 1908 that the amount taken was of commercial importance. At first the fishermen were not interfered with by the Mexican government, but later patrol boats were put on, and at present there are Mexican agents in San Diego and San Pedro from whom fishing permits must be obtained and to whom catches must be reported.

In 1920 from sixty to sixty-five power boats operated in these southern waters, but during the tuna season only about half that number go south. This number is likely to be largely increased in the future.

"In 1918 the average take of fish in Mexican waters by California fishermen was 700,000 pounds per month, on which export duty of $3,500 was paid, boat charges, clearance, etc., being additional."

"It was estimated in 1920 that of the important food fishes brought into southern California the following proportions were taken in Mexican waters, the balance being secured north of the line.

	Per cent
Halibut (so-called)	80–90
Barracuda	75
Sea bass, white	60
Rockfishes	10

"Boats coming from Mexican waters frequently bring huge cargoes. In 1918 the Veribus Unitas entered San Diego harbor with 46 tons of fresh fish. Another boat brought in a 31 ton catch of barracuda and bonito."

UNITED STATES LEADS IN GAME REFUGES.

In commenting upon bird sanctuaries, the Spring Number 1923, of *Bird Notes and News*, a British publication, urges increased effort toward the establishment of national bird sanctuaries and wild-life reservations in order to prevent the reckless depletion of both birds and other fauna. In the establishment of national wild-life reservations the writer says that the United States and Canada have been leaders, and that Africa, Australia, New Zealand and India have made beginnings. Holland, thanks to the efforts of a number of eminent enthusiasts, has many fine bird sanctuaries, and in this respect is ahead of all Europe. Bohemia is taking steps toward the establishment of several national refuges, particularly for waterfowl. In Great Britain, although there are a few private and municipal sanctuaries, there are no national wild-life sanctuaries. Present laws make it

possible to forbid killing birds and taking eggs in certain localities, but since there is no provision made for guardianship of any kind, it is difficult to enforce such a prohibiting order. It is a hopeful sign that the subject is to be discussed at the International Conference which meets in Paris this summer.

CONDITIONS IN REFUGE 1D.

On April 30, a trip was made to the salt grounds within Game Refuge 1D in the Trinity National Forest. At an altitude of 8000 feet and in the timber on the north side of the mountain, snow was five feet deep, but there was no snow at all on the south slopes. The deer had already arrived and were gathering around the salt grounds waiting for their rations. Last fall, 200 pounds of salt were packed in and stored in the Lookout Station, so a supply was available. The deer proved to be very tame—they would just move out of the way and stand.

Several deer died last winter in Trinity County but I do not believe death was due to any contagious disease. All that I examined were very poor and were covered with ticks and lice. There was nothing in the stomachs or lungs of those examined to correspond with the malady of several years ago.

Quail were found about half way up the mountain, apparently following the feed.

The general outlook for hunting and fishing for 1923 is very good. The Forest Service has built many new trails and wagon roads, and with the expected completion this fall of the Hyampon-Hayfork road, Trinity County's hunting grounds will be open to auto travel. New signs using the old Indian name of Ghost Mountain have been conspicuously placed along the road from Hayfork to Hyampon. Each year finds the refuge more highly appreciated by the residents of Trinity County.—G. O. Laws, Douglas City, California.

PELAGIC SEALING PROHIBITED.

On April 9th, President Harding issued an executive order designed to protect from unlawful pelagic sealing, the herds of fur seals that annually migrate through Alaskan waters to the Pribilof Islands. This was done in pursuance of an act of Congress concluded in July, 1911, "to give effect to the convention between the governments of the United States, Great Britain, Japan, and Russia, for the preservation and protection of the fur seals and sea otters which frequent the waters of the North Pacific Ocean." Patrol of the waters by six boats of the Bureau of Fisheries is ordered and the masters of the vessels, together with a few other designated employees of the Bureau, are empowered to search any vessels of the United States suspected of violating the laws, and to seize and bring into port for trial, the officers and crews with the vessels. Fisheries Service Bulletin No. 96, further reports that in the

FIG. 29. New signs for the Trinity County Game Refuge.
Photograph by G. O. Laws.

12 days following the promulgation of the order, about 25 illegally taken skins were seized by three of the boats engaged on the patrol.

THE MIGRATION OF DUCKS.

There has been much speculation as to the breeding grounds of ducks wintering on Lake Merritt, Oakland, and in the great valleys of California. The practice of banding and releasing migratory birds, which is being carried on by numerous ornithologists and bird enthusiasts under the direction and supervision of the U. S. Department of Agriculture, is helping to solve the problems of where the birds go when they leave their nesting grounds and what routes they take. It is indeed the only means of getting certain and definite data regarding individuals or groups and the routes taken by them. There has been much more activity in bird banding in the eastern states than in the west, but Mr. J. Eugene Law, in charge of organization on the Pacific Coast, is authority for the statement that more than forty permits have been issued to banders on the Pacific slope.

In Bulletin No. 1145, of the U. S. Department of Agriculture, issued in May, 1923, Alexander Wetmore, of the Bureau of Biological Survey, gives the records of many birds banded in the Bear River marshes of the Great Salt Lake, Utah, where large numbers of migratory birds congregate. Mr. Wetmore was studying alkali poisoning among the birds of those marshes from 1914 to 1916, and during that period 1241 birds of 23 different species were banded. The majority of these were wild ducks comprising 9 different species. With the exception of a few birds turned over to the State Fish and Game Commission in 1916 for exhibition purposes and later released near Geneva, Utah, all of the birds banded were released near the mouth of the Bear River, Utah. Of this number, returns were received on 182 birds, a little over 14 per cent. Of the 994 ducks banded, 174 were retaken, giving a return of 17 per cent on the birds of this family. It should be stated that many of these birds had not bred in the vicinity as drake pintails and mallards begin to arrive there early in June and continue to come until late in the fall.

Distinct migration routes were traceable, one of which was southwest from the Salt Lake Valley to California, traveled by the green-winged teal and shoveler and some of the mallards and pintails. One group, made up of cinnamon teal, redhead, pintail and mallard, find their way into Texas by two different flight routes. The third route is a general drift southward over the Rocky Mountain Plateau to the scattering ponds and lakes of southern Utah, New Mexico and Arizona. Indications are that this route is followed by a smaller number of birds, including the snowy herons as well as some of the ducks.

The following tabulation indicates the species upon which returns were received and shows the number of each reported upon:

	Banded	Returned
Double-crested cormorant	1	1
Mallard	72	22
Gadwall	17	4
Green-winged teal	336	49
Cinnamon teal	45	5
Shoveler, or spoonbill	48	9
Pintail	221	34
Redhead	239	51
White-faced glossy ibis	104	1
Great blue heron	11	4
Snowy heron	83	4
American coot	18	1

Of the comparatively small number of mallards banded, about 30 per cent were afterward reported. One of these, banded September 24, 1914, was recovered October 16, 1916, nine miles south of Bishop, California. None of the gadwalls were traced to California, but of the 49 green-winged teal recovered out of the 336 banded, 19 were taken in California over a range extending from Yolo County to Orange County. None were taken north of Sacramento, two in Kern County, several near Los Banos, while on the coast two were taken in Orange County and one at Watsonville. As most of the others were killed near the place where they were banded, the conclusion was drawn that most of the green-winged teal which leave Utah winter in California. No cinnamon teal were recovered in California but one shoveler or "spoonbill" was taken near Vallejo, October 28, 1917, having been banded September 1, 1916. Since six of the nine banded were retaken in the same vicinity within a very few weeks, and two at other points in Utah, there is slight evidence that some shovelers come from Utah to California to spend the winter.

It is apparent that many pintails migrate to the interior valleys of California, for eight returns were made from an area extending from the marshes above Suisun Bay to a point south of Calipatria in the Imperial Valley. Boundaries of the various migration routes followed by the pintails recovered are indicated as being east as far as western Missouri and north as far as southern Saskatchewan, Canada. One of the pin-

tails banded lived four years after being released. None of the large number of redheads banded were retaken in California.

Among other interesting facts gained from the study was that out of 104 young white-faced glossy ibises banded in their rookeries only one individual was recovered. As this bird was marked July 3, 1916, and was found October 22, 1922, on the shores of Tulare Lake, a southwest migration movement from the Salt Lake Valley to California would seem to be indicated. The nests of snowy heron are found in colonies in the lower Bear River marshes where, on July 3 and 14, 1916, 83 nestlings were banded. Three of the four recovered were found in Mexico, the fourth in Arizona, upon dates that would indicate that these herons from the breeding grounds of Utah winter on the west coast of Mexico.

There are many other problems aside from migration routes, length of flights, ages of birds and so forth to be solved by bird banding, such as differences in plumage at various ages and at various seasons; whether the birds return to the same nesting sites; rate of growth; and diseases affecting different species as discovered by those cooperating in this work under the Biological Survey. As the practice becomes extended it is anticipated that much valuable data concerning western birds will be collected in this way, as has already been done in the east.

FIG. 30. Digging Pismo clams near Watsonville, California, April, 1923. Photograph by J. H. Hill.

SCIENTIFIC WORK OF THE COMMISSION APPRECIATED.

That the valuable studies of California fishes prosecuted under the administration of Mr. N. B. Scofield, in charge of the Commercial Fisheries Department, are of the very highest order and an accomplishment which promises soon to place California ahead of other states in respect to the care of her fisheries, is pointed out by Mr. Willis H. Rich, in charge, Division of Scientific Inquiry, U. S. Bureau of

Fisheries, writing in the *Stanford Illustrated Review*, for May, 1923 (p. 406). Mr. Rich also expresses anxiety lest the scientific work of the commission, pursued by Mr. Scofield's division and under the supervision of Mr. Thompson, should be discontinued for lack of funds. This, according to the writer, would be a calamity, not only to the scientific development of California fisheries, but also to the country at large.

LOUISIANA'S SUPERLATIVES.

In *Conservation News*, the bulletin of the Louisiana Department of Conservation, April, 1923, attention is called to the resources which Louisiana possesses in superlative degree. Pertaining to fish and game are the following interesting facts. In 1922 the value of the state's sea food products totaled about nine million dollars. The annual yield of the fur products of that state ranges between two and three million dollars. Louisiana is the possessor of the greatest public shooting ground in the world as well as the largest areas in the world where waterfowl and other forms of wild life are completely protected. No other state has an area suited to oyster culture as great as that of Louisiana—477,000 acres.

That these things are true is largely due to a broad-visioned, wisely-planned conservation policy to which sympathetic public support has been given. Back of it all lies education and publicity of the right kind.

NUMBER OF HUNTERS INCREASING IN UNITED STATES. HOW ABOUT THE GAME SUPPLY?

It is estimated that there are in the neighborhood of 8,000,000 hunters in the United States. During 1921–22, the number of persons in 46 states who purchased hunting or fishing licenses, or both, ran close to the 5,000,000 mark. Two states, Mississippi and North Carolina, had no fish and game commissions, (North Carolina has since organized one); in Delaware residents are not required to purchase a license; in Texas it is unnecessary to have a license for the county in which one resides; and in Florida reports are very incomplete because county judges are not required to make reports on license sales. According to the Department of Agriculture nearly 3,000,000 hunters are, for just such reasons, exempt from taking out a license. The National Sports Syndicate has for five years been gathering statistics regarding hunting and hunters and during that time they have found that the number of licensed hunters has increased at the rate of never less than 50,000 a year. It would be valuable to know whether the supply of game is being maintained in spite of this rapid increase of hunters, or is diminishing, or whether, possibly, due to game protection and propagation, regulation of the hunting season, law enforcement and other measures, game is increasing. Mr. Peter P. Carney of the syndicate suggests that it would be to the best interests of all concerned if every state fish and game commission would keep a record and send out figures on the number of licenses issued, the amount paid for them, the amount of game taken and, as nearly as can be determined, the amount of game remaining.

TREES AND BIRDS.

It has been shown time and time again that increased planting of trees furnishes attractive food, nesting sites and shelter for birds. Oftentimes the planting of trees has not kept pace with the destruction of trees. It is gratifying, therefore, to see the enthusiastic support given the plan to beautify the state's wonderful system of highways by tree planting. There are many sections in the great valleys where not a tree exists for many miles. Many a lonely country roadside will in the future be made more cheerful by the presence of a line of beautiful trees which give shelter to hundreds of song birds, due to the foresight of those promoting the planting of trees along the highways, in school grounds and parks, and in private gardens.

CHANGES IN FEDERAL GAME LAWS.

Amendments to the Migratory Bird Treaty Act Regulations, adopted by the Secretary of Agriculture and approved by the President on June 11, include a change in the season for hunting migratory waterfowl in Pennsylvania from September 16–December 31 to October 1–January 15, and in Oklahoma and that part of Texas lying north and west of the International and Great Northern and the Texas and Pacific Railroads from October 16–January 31 to October 1–January 15, while the season in southeastern Texas was changed from October 16–January 31 to November 1–January 31.

The open season for hunting doves in southeastern Texas was changed from September 1–December 15 to November 1–December 31, and in South Carolina from September 1–December 15 to November 1–January 31.

These changes were adopted at the solicitation of state game officials and interested sportsmen in the sections affected, and are believed to be in the interest of conservation.

Other amendments authorize the issuance of permits for propagating waterfowl and for scientific collecting purposes to be valid until revoked by the Secretary of Agriculture, thus obviating the necessity of renewing such permits from year to year to cover continuing operations. The latter amendments are designed to facilitate the administration of the law and regulations. Annual reports from permit holders will be required as heretofore.

TAKING BIRD CENSUSES.

A new government publication, Department Circular 261, The Purpose of Bird Censuses and How to Take Them, by May Thacher Cooke, assistant in biological investigations, has been issued by the United States Department of Agriculture, and is available on application to the Biological Survey or the Division of Publications, United States Department of Agriculture, Washington, D. C.

This publication is designed for persons now cooperating in taking bird censuses, also for ornithologists and others desiring information on the subject. In addition to an explanation as to the need of data regarding the numerical distribution of the various species of birds in different sections of the country, the circular gives instructions on how to make local counts, the time to begin, and the types of tracts from which censuses are desired. These include farm land, wood land, irrigation projects, marsh land, and other special areas.

Directions are given for rendering a report of each census when taken. Blanks for these records are furnished by the Bureau of Biological Survey.

ENCOURAGING CONDITIONS PREVAIL IN ALASKA IN 1922.

A spirit of public cooperation in respect to the conservation of wild life in Alaska is more widely marked than ever before, says Governor Scott C. Bone in his second annual report to the Secretary of Agriculture on the Alaska Game Law. Respect for the law is the rule, and the schools of the territory are cooperating by the use of a questionnaire on animals and birds.

Conditions touching animal and bird life in Alaska have been very favorable during the past year in the opinion of the governor. Game is said to be plentiful, and animal life of all varieties seems to be increasing.

Sentiment continues to favor removing the protection afforded the brown bear, which is a dangerous predatory animal. At Afognak last year three hunters met four ferocious bald-faced Kodiak bears and one of the hunters was killed. There are few black bears on the Alaska Peninsula, though they are plentiful and increasing in the Kantishna, Fairbanks, McCarthy, and Ketchikan sections.

Ptarmigan and grouse have shown gains, and geese and ducks are reported in numbers in the region of Lake Minchumina, according to the governor's report. Many fur-bearing animals are increasing, including a variety known as the tundra mink. Arctic hares are reappearing by thousands, as well as rabbits, and are doing considerable damage to planted areas. The depredations on fur bearers and game animals by wolves, wolverines, eagles, hawks, and coyotes, which also are increasing, seem to warrant stringent measures for their control. Fox farming on the islands of southeastern Alaska is proving profitable and popular.

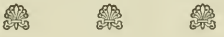
One thousand dollars was paid to the territory for hunting licenses during the fiscal year ending June 30, 1922, and in addition, $300 was paid for special moose-shipping licenses and $290 for other licenses.

FACTS OF CURRENT INTEREST.

In March last, the collapsing of a municipal dock at Monterey precipitated forty cases of canned sardines into Monterey Bay. Most of the cases were salvaged after efficient work by the members of the fishing fleet.

Fishermen in Suisun and San Pablo bays who persist in setting nets or using illegal nets are gaining experience at high cost, for fines averaging $100 are regularly meted out.

The trout season opened auspiciously on May 1. Fishing has been remarkably good, due largely to the series of good years with a maximum of water and to the restocking operations of the Fish and Game Commission.



Educational work in the summer resorts is being continued in Yosemite National Park this year. Increasing interest in this educational program is very evident.

Striped bass anglers who sought legal protection for their night fishing activities will have to accommodate themselves to a new law with the same provisions in order to make law enforcement possible in connection with commercial fishing.

As evidence of the important part played by the automobile in increasing the toll of game taken, it may be pointed out that Deputy J. O. Miller counted forty-seven machines on the edge of the lava beds on the opening day of the deer season of 1922. All of these machines carried hunters interested in securing a mule deer.

HATCHERY NOTES.

W. H. Shebley, Editor.

THE SPAWNING SEASON.

Splendid success has attended the special efforts of the fishcultural department to obtain a large take of trout eggs for the hatcheries. The eggs taken have passed the 29,000,000 mark which means that this year's supply has exceeded that of last year by over 4,000,000. With the exception of floods at Lake Tahoe which washed out racks and interfered with operations for black-spotted trout, conditions have been very favorable. The Snow Mountain Spawning Station furnished an unusually large number of steelhead eggs. On the other hand, the take on the Klamath was 50 per cent below normal. The Feather River Hatchery, now practically completed, is operating with a capacity of 850,000 eggs. The Kaweah Hatchery contains 400,000 and the Wawona Hatchery has a like number. Spawning operations were still in progress on June 1st at the spawning stations in Plumas and Lassen counties. Operations at Rae Lakes have been postponed owing to the impossibility of crossing the high mountain passes.

BREEDING PONDS YIELD LARGE NUMBER OF EGGS.

A dependable supply of trout eggs is always available from the brood ponds at the Mount Shasta Hatchery. Nearly one-third of all of the trout eggs utilized in the state hatcheries are derived from brood fish. The season 1923 furnished 2,760,000 eastern brook, 5,270,000 Loch Leven and 1,500,000 brown trout, making a total of 9,530,000 eggs.

EASTERN BROOK TROUT EGGS IMPORTED.

An exchange of 1,000,000 Loch Leven trout eggs for an equal number of eastern brook eggs with the New Jersey Fish and Game Commission will furnish an added supply of pure eastern stock to the streams of the state. In the east, the Loch Leven is in great demand as it is thriving much better than other species in eastern streams where sewage disposal pollutes practically every stream. This species, along with the brown trout, seems to be especially resistant to disease. The rainbow has been found impractical under most conditions in eastern states.

MACKINAW TROUT SECURED.

For the first time in many years it has been possible to secure eggs of the Great Lakes trout, the species commonly called Mackinaw. One hundred thousand fry now thriving at the Mount Shasta Hatchery were planted in late June in Clear Lake, Lake County, and in Eagle Lake, Lassen County.

This species was introduced in California in 1894 when 93 per cent of a shipment of 100,000 eggs were hatched at the Sisson Hatchery. In May of the following year, 65,000 of these fry were planted in Lake Tahoe, the remainder being held for shipment the next season. At other times, lots of eggs were hatched at Sisson and the fry planted in the various lakes of the Truckee Basin. Coming from the lakes Superior, Huron and Michigan, these trout are adapted to the cold, clear waters of deep lakes and should grow to a large size in Lake Tahoe. They have not, however, thrived as have other introduced species. Many years ago some young were taken in Fallen Leaf Lake during spawning operations, but apparently spawning grounds are not suitable.

STEELHEAD AND RAINBOW TAKEN IN TAHOE.

Steelhead and rainbow trout introduced into Lake Tahoe two years ago appear to be thriving, for several weighing up to 1½ pounds were taken during spawning operations this spring.

BROWN TROUT TO BE PLANTED IN RUSSIAN RIVER.

The steelhead run in the Russian River is largely a thing of the past. The bar at the mouth of the river, which has precluded the entrance of fish, has been one important factor concerned. In order to furnish angling for the many vacationists who line its banks each summer, brown trout are to be introduced this year. This species should prove the best adapted for this stream. Rainbow are also to be planted but they will doubtless inhabit the higher reaches of the river. The brown trout thrives in the slower moving, warmer waters.

MANY SCREENS INSTALLED.

During six weeks in late spring, seven large rotary screens were installed in irrigation canals. Most of these were built in Sacramento.

CONSERVATION IN OTHER STATES.

ARIZONA SOCIETY INTERESTED IN PRESERVING HEATH HEN.

The Tucson Natural History Society, through its conservation chairman, Mr. Hugh G. Calkins, has expressed to the Director of the Massachusetts State Department of Conservation, the hope that a thorough investigation may be made to determine the cause of the reduction in numbers of the heath hen on the Island of Martha's Vineyard and to find, if possible, some means of successfully maintaining the species. Formerly abundant, there now remains of the heath hen a flock of only 150 individuals on the island. We agree with the Tucson society that thoughtful people everywhere, who are lovers of nature, will be interested in an effort to preserve the existence of this, or any other valuable or interesting species, wherever they may be, whose continued existence is threatened.

MICHIGAN AND THE BOUNTY SYSTEM.

Much has been written pro and con on the bounty system of controlling predatory animals. Recently, the State of Pennsylvania defended the system. The State of Michigan takes the opposite point of view and recommends the abolition of the system. In 1919 this state paid $124,446 in bounties on wolves. In 1922 the sum amounted to $36,043.50. The state comptroller states: "Personally, I do not believe that this bounty is a benefit to the state, and, doubtless, fraud is practiced. As the state has been paying bounty on wolves for twenty-five years and, instead of the number growing less, they seem to be increasing."

Furthermore, the expense of the bounty system has grown from $232 in 1870 to $371,236.44 paid in nine months of 1922. The sum of $1,100,000 has been paid in bounty claims since 1869. Numerous instances of fraud are said to show that, in spite of precaution, fraud can not be eliminated.

Although the government pointed out many years ago that bounty systems had proved expensive, ineffective and invariably conducive to fraud, yet many states still continue to spend vast sums on a bounty system.

NORTH CAROLINA VOTES DOWN NEW GAME BILL.

North Carolina and Florida are the only states without state-wide game laws. For the past twelve years repeated attempts have been made by conservationists to place North Carolina in line with surrounding states, but to no avail. Last December, the North Carolina Fish and Game Development League was organized to support a measure introduced in the legislature. When the game bill providing for protection of wild fowl and fur-bearing animals came to the floor, a dozen counties sought exemption and, in short order, the bill was laid on the table by a vote of 52 to 42. Thus was disposition made of the most recent attempt to establish an intelligent system of state enforcement of the bird and game laws.

TEXAS INTRODUCES BOB-WHITE.

According to the 1922 report of the Game, Fish and Oyster Commission of Texas, 1200 bob-white have been introduced into that state and favorable reports are being received continually.

A census of the antelope still remaining in Texas shows that there are about 547 individuals, all of which have taken to rough country where they are least molested. The very few mountain sheep which are left within the state are receiving adequate protection only where cattlemen who own the range take measures to keep out the poacher.

NEW MEXICO'S NEW GAME CODE.

In Mexico's new game code, enacted by the fifth legislative assembly, are numerous additions and amendments of outstanding interest. The alien gun law is a stringent one, making it "unlawful for any unnaturalized, foreign-born resident of New Mexico or of adjoining states, to use or have in possession, or under control within the state, any shotgun or rifle of any kind." A residence of five consecutive days in that or any adjoining state, causes any unnaturalized, foreign-born person to be considered a resident, and therefore liable to the penalties provided for violating any provision of the act. Night hunting, the use of high-powered rifles in the taking of migratory game birds, the killing of game with steel or hard pointed bullets or with any weapon other than ordinary shoulder guns or pistols is prohibited.

Certain plenary powers are given the commissiou which makes it possible to apply conservation measures promptly and avoids the necessity of waiting for legislative enactment as must be done in California. Among these are authority

to receive gifts or bequests of lands suitable for use as game refuges, hunting grounds, fish hatcheries or for other purposes in accord with the act; power to close hunting at all times or at certain times on designated areas in order to provide havens where migratory birds may rest and feed unmolested; permission is also given to close any public waters to fishing, for the purpose of protecting spawning grounds or recent plantings of fish, or to prevent the depletion of the supply of fish; to aid in reducing the danger of destructive forest fires, the commission is given authority to forbid hunting entirely at such places and times as extreme danger of forest fires exists.

MICHIGAN INSTITUTES CAMPAIGN OF EDUCATION.

In its last biennial report, the Department of Conservation of the State of Michigan outlines an intensive campaign of education and publicity conducted during the past two years. Activities have been confined to the display of motion pictures and stereopticon slides, lectures on nature subjects and conservation, and issuing of booklets, pamphlets and posters covering activities having to do with natural resources. Ten 1000-foot reels of motion pictures are in almost constant use. A large number of very attractive posters have been distributed throughout the hunting regions and many booklets have been issued. Elementary works covering the flora and fauna of the state are planned for the use of school children.

IDAHO REORGANIZES FISH AND GAME DEPARTMENT.

Governor C. C. Moore of Idaho has appointed Mr. R. E. Thomas, who for the past four years has been Assistant Chief Deputy Warden, as State Fish and Game Warden to succeed Mr. Otto M. Jones, resigned. Mr. Thomas is said to have an intimate knowledge of the work, and, added to that, a knowledge of the conditions confronting the farmers and stockmen, so that harmony is expected to exist between those who hunt and fish and those interested in ranching. The *Mountain Home* (Idaho) *Republican* quotes Mr. Thomas as saying: "We have reduced the number of field men about 25 to 30 per cent and it is now our aim to cut this force down to around 30 and put the money thus saved into propagating and preserving our fish and game resources. This means that local wardens will be cut out in some instances and no new wardens will be added. Our force will be so distributed that the state will be covered most efficiently and, with the cooperation of the people in helping us to cut down our number of employees, we will be able to have more funds for building up our resources.

LIFE HISTORY NOTES.

OSPREYS IN MODOC COUNTY, CALIFORNIA.

On May 20, 1922, in company with U. S. Game Warden R. C. Steele, the writer made an auto trip between Malin, Oregon, and Clear Lake Reservation, California. This country is rolling, rocky, arid desert land, sparsely covered with a growth of juniper and sagebrush.

During the trip, four nests of the osprey (*Pandion haliaetus carolinensis*) were noted in juniper trees ranging approximately from 25 to 35 feet in height. Three of these nests were examined and two of them contained three eggs each, while one other was about completed and ready for its compliment of eggs. The fourth nest was not examined, except from the ground. One nest containing three eggs also contained a sucker about twelve inches in length, which had evidently been brought from Clear Lake, about eight miles distant.

None of these nests was closer than about five miles from open water. Three of the nests were saddled in the forks of stout limbs, while the fourth nest was built on the very topmost branches of the juniper about twenty-five feet high. The upper limbs of this tree were dead and the nest could be seen from a long distance. At all four nests, both parent birds were present and at two nests the parent birds were assisted in their demonstrations by their neighbor ospreys.—STANLEY G. JEWETT, 515 P. O. Bldg., Portland, Oregon.

REMARKABLE FLIGHT OF HAWKS.

On April 17, 1923, a very rainy day in El Dorado County, my attention was called to a flight of hawks, believed to be Swainson hawks (*Buteo swainsoni*), passing over my place on Lotus Road, near Placerville. The flight continued for a half hour and by 2. p.m. the main part of the flight was over. At least a thousand birds were included in this migration. My brother, who also witnessed the flight, left for Placerville while it was in progress and stated that a much larger number passed over "Thompson Hill," a range of hills to the east. The stomachs of specimens taken were examined by Dr. H. C. Bryant and found filled with black crickets (*Gryllus* sp.). If the entire flock had fed upon the insects, as it is reasonable to suspect, the birds undoubtedly rendered a valuable service to the locality from which the crickets were collected. It would be interesting to know how far the hawks had traveled and when and where they had secured the crickets.—GEORGE WILLIAMSON, JR., Placerville, Cal.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1923.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Glenn, Colusa, Tehama	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego
Albacore												1,064			1,064		
Anchovies										5,300		10,537			15,837		
Barracuda											150	74,755	904	105,363	181,172	785,232	172,008
Bluefish										3,960					3,960		
Boccaccio								24,555	92,821	311,220	4,937				433,533		
Bonito										3,325		25,269		2,850	31,444	38,489	16,812
Carp		12,185		1,894		7,367	13,800	76							35,322		
Catfish		34,283				3,497									37,780		
Chilipepper								15,448	66,990						82,438		
Cultus Cod	2,398							95,047	7,042	31,720				2,728	138,935		31
Dolphin																	
Eels														55	55		
Flounders	13,719		12	49			5,146	150,099	14,972	1,280		27		172	185,476		110
Grayfish								70,695				1,827		50,580	123,102		
Greenfish																	
Hake								1,290							1,290		
Halibut								2,966	627	762	74,680	347,225	28,750	80,130	535,140	170	158,604
Hardhead						5,608									5,608		
Herring	2,501		24,435				65,637	175,052	158						267,783		
Kingfish									33,682	11,725		76,733		2,274	124,414	122	135
Mackerel									10	74,796	2,467	466,976	30,932	71,385	646,566	30,311	2,940
Marlin																	
Mullet																	
Perch	25,063		16,849	108			19	11,388	171	13,505	404	503		6,654	7,157	9,882	14,928
Pike				107		432	1,575	6				37,500	47	729	105,783	22,114	1,165
Pompano								562		14					2,120		
Rock Bass												1,807			2,383	5,456	1,912
Rockfish	150											35,846	1,732	6,801	44,379	8,054	3,248
Sablefish								168,072	118,187	375,813	27,865	627,056	21,782	226,592	1,565,517	515	8,534
Salmon	281		2,422	26,214	42,160	18,300	22,242	47,901	11,008						58,909		
Sandabs								285,123							396,742		
Sardines								327,958		80		3,312	5		331,355		
Sculpin								3,880	175	18,560,635	1,060	52,741,012		3,664,531	74,971,293		
Sea Bass—Black												13,212		2,635	15,847		
Sea Bass—White												5,974		11,647	17,621	4,234	75,989
Sea Trout								17	247	18	29	32,628	1,012	52,750	86,701	92,914	16,600
Shad				1,028		4,424	26,382	3,889	49					481	481		21,450
Shad—Buck				3,799		1,484	23,604								35,772		
Shad—Roe				5,645		972	30,023	5							28,887		
															36,645		

Sheepshead												65	1,859	34	19,531	21,489		75
Skates								51,271		665			2,002	188		54,126		
Skipjack																		2,270
Smelt	4,131		7,281					37,470	616	551	33,739		98,939	2,536	6,163	191,426	1,075	870
Sole	50							1,796,998	8,393	9,705	21,827		71,237	920	5,565	1,914,695	95	209
Splittail						13,100										13,100		
Striped Bass			585	21,434	119	31,414	187,630	17,557		13						258,752		
Stingaree													365			365		
Suckers						273										273		
Surf Fish																		
Swordfish																		70
Tomcod								13,231								13,231		
Trout—Farm																		
Trout—Steelhead																		
Tuna													27,580			27,580		
Tuna—Bluefin																		
Tuna—Yellowfin																		16,823
Turbot			479													479		
Whitebait	1,705		135					2,057		40						3,937		
Whitefish													2,256		5,890	8,146	371	2,085
Yellowtail													44,341	420	70,188	114,949	139,256	197,959
Miscellaneous		4,700		1,027			670	23,631	1,581	1,653	9,413		24,390	174	536	67,775	2,041	2,997
Total Fish	49,998	51,168	52,198	61,305	42,279	86,871	376,728	3,326,244	356,729	19,406,780	176,636		54,776,232	89,436	4,396,230	83,248,834	1,140,331	717,854
Crustaceans:																		
Crabs	[1]142,680	[2]3,744	[3]10,680				[4]120	[6]294,000	[7]1,056	[8]216						452,496		
Ecrevisse																		
Shrimps			32,428					199,999								232,427		
Spiny Lobsters											26,121		54,348	4,645	40,273	125,387	11,300	355,753
Mollusks:																		
Abalones			40							80,295	7,707					88,042		
Clams—Cockle	3,390		10,841										3,076			17,307		
Clams—Mixed	5,856		2,422													8,278	397	400
Clams—Pismo									720		52,387					53,107		
Clams—Softshell		490	16,880				41,083	12,412								70,865		
Cuttlefish								4,718	16,782	20,798						42,298		
Limpets																		
Mussels							280	1,345	50	790	35		1,000			3,500		
Oysters—Eastern			[5]210,234													210,234		
Oysters—Native																		
Snails																		
Squid										120			76,630		925	77,675	4,381	
Miscellaneous:																		
Frogs																		
Terrapins																		
Turtles																	785	1,050
Totals	201,924	55,402	335,723	61,305	42,279	86,871	418,211	3,838,718	375,337	19,508,999	262,886		54,910,286	95,081	4,437,428	84,630,450	1,157,194	1,075,057

All amounts shown in pounds. [1]5,945 doz. [2]156 doz. [3]445 doz. [4]955,608 shell oysters. [5]5 doz. [6]12,250 doz. [7]44 doz. [8]9 doz.

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 9 SACRAMENTO, OCTOBER, 1923 Number 4

CONTENTS.

Page

THE WOLVERINE ..... *Walter Fry* 129

NOTES ON THE EGG YIELD OF SACRAMENTO RIVER KING SALMON ..... *E. A. McGregor* 134

A POSSIBLE SEPARATION OF THE RIVER RACES OF KING SALMON ..... *E. A. McGregor* 138

A SHEEP-KILLING BEAR ..... *L. N. Lorenzen* 151

A SALMON'S LAMENT AT THE ESTACADA FISHWAY ..... *E. A. McGregor* 153

EDITORIALS 154

FACTS OF CURRENT INTEREST 164

HATCHERY NOTES 165

COMMERCIAL FISHERY NOTES 168

CONSERVATION IN OTHER STATES 174

REPORTS—

INCOME AND EXPENDITURES 176

FISHERY PRODUCTS, APRIL, MAY AND JUNE 178

VIOLATIONS OF FISH AND GAME LAWS 180

SEIZURES 182

INDEX TO VOLUME 9 183

THE WOLVERINE.

By WALTER FRY, In Charge, Nature Guide Service, Sequoia National Park.

The Sierra Nevada wolverine (*Gulo luscus*), is making his last stand. The animal is found in the high sierra between 6500 and 13,000 feet and is making a losing fight. Man is an enemy who seeks to kill the wolverine at every opportunity; while the porcupine, when captured as food by the wolverine, proves a fatal meal, his sharp quills puncturing the wolverine's intestines and causing painful death within from seven to ten days.

Range of the Wolverine.

Wolverine formerly ranged in the forests of the colder parts of North America from the northern limit of timber line south to New England and New York; in the Rocky Mountains south to Colorado, and along the Sierra Nevada Mountains to Mount Whitney and Sequoia National Park, California. The inroad of settlement, the persistent hunting and trapping of the animal for its beautiful fur, the enmity the animal has gained by reason of its bad morals, as well as his taste for porcupine, has resulted in the animal's becoming extinct over the greater portion of its former range. Where still found, the individuals are few and scattered.

The last stand of the wolverine is in the western part of its range and it is becoming very rare. Wolverine are most abundant in the vicinity of Mount Whitney and Sequoia National Park. This fact is, perhaps, due to the ruggedness of the country and the protection afforded by the National Park service. Many of the animals have been killed in recent years near the park and were, no doubt, products of the park. The last capture was at Mineral King during the winter of 1921-22. Three animals were taken. All were fine specimens and in excellent condition. The largest weighed about 25 pounds. One of these skins is now on exhibit at the park museum at Giant Forest. This catch practically wiped out the species in the Mineral King district for the tracks of but one animal have since been observed in that vicinity.

Family and Description.

The wolverine is by far the largest and most formidable member of the weasel family. It is a strong, heavy-bodied animal seldom weighing over 25 pounds or exceeding 22 inches in height or 40 inches in length, with a tail about 8 inches long, covered with long, coarse hairs drooping to a brush. The head is short and wide with powerful jaws set with heavy teeth. The legs are short and heavy and the feet are armed with long, sharp claws. The coloring of the pelage is unique and beautiful being mixed with black, yellow and gray. The front and sides of the head are grayish while the body is black varying to chestnut brown with a broad, undefined yellowish band along the sides and over the hips, meeting at the base of the tail.

King Beast of the Sierras.

The wolverine, commonly speaking, is not an aggressive animal but will fight desperately when attacked or for the care of its young. When once engaged in combat the beast knows no such thing as retreat, dying, if need be, but never falling back. He fights on as long as a single spark of life remains. Mountain lion, bear and mountain coyotes, whether coming singly or collectively upon a wolverine, seem to fully realize his ferociousness and quickly give way to his path. They know, through long experience, that this is an animal which must be let alone so undoubtedly believe in the logic of "live and let live." The wolverine not only expects the larger animals to let him alone but requires them to give up their own prey and permit him to satisfy his gluttonous appetite.

That the wolverine ranks as king beast of the sierras, to me there is not a shadow of doubt. This fact is borne out by reason of my own observations as well as those of others who have noted their conduct toward other wild animals at certain times and at various places within Sequoia National Park—a few instances of which I will relate:

July 30, 1906—Two adult bear, one black and one brown, gave over to one adult wolverine, with excitement and great haste at Buck Canyon, the carcass of a cow upon which they were feeding.

October 1, 1907—Three large mountain coyotes that were feeding on the carcass of a horse at Grouse Flat vacated the vicinity immediately upon the approach of one medium-sized wolverine.

September 30, 1908—One large and one medium-sized mountain lion were feasting on a deer that they had recently killed at Willow Meadows, but after much growling and threatened resistance on the part of the larger lion both gave way to the approach of one medium-sized wolverine.

Feeding Habits.

The wolverine has no winning bursts of speed to catch his food supply; nor has he the gift of stalking his quarry. His lack of speed and skill has forced the animal to be a scavenger and eat anything in the way of flesh that is captured or found dead. He has a voracious appetite but no doubt can fast for many days, a condition to which he is often forced during the deep snow of winter. Because of his voracious appetite the animal is often called the "glutton." This seems appropriate, for not elsewhere in North America do I know of a mammal in proportion to its size with such capacity for coarse food at one given time, or which has such powerful organs for the digestion, as that of the wolverine. His principal food in the Sierra Nevada consists of the yellow-bellied marmots, carrion, gophers, rats and mice, with occasional sick or crippled wild animals which he is able to drag down. With his long claws and great strength he can dig very rapidly and catch many of the smaller rodents in their burrows. The wolverine does not hunt in mass formation, as do the wolves, but simply braves it alone in a solitary way.

Wolverine are tireless wanderers and do most of their traveling at night but when forced by hunger they will hunt by day. They have but little migratory impulse and usually remain in the vicinity where born. They do not dig burrows in which to live or for shelter and protection, as do some of their smaller brethren, but simply lie down in places at random, usually under some shelving rock or at the base of a tree.

Bad Morals.

The wolverine has very bad morals that have gained him the enmity of not a few. It often follows the trap lines of fur trappers, eating or destroying the catches, baits, and, at times, dragging away the traps.

It will also occasionally invade the rangers' and trappers' cabins by tearing a hole through the roof or side wall, destroy the food contents, and what it can neither eat nor carry away it defiles in such manner as to render it unfit for use. A wolverine will expend a surprising amount of labor in the carrying off and burying of foodstuffs and often include other articles for which it has no use.

Personal Experiences With Wolverine.

The tradition that wolverine are ready to attack any human being gives the impression of a very dangerous animal; but I regard it as pure fiction. On two occasions have I come upon wolverine alone in the daytime in their natural haunts in the Sequoia National Park, where they had probably never before been disturbed by man. Neither time did they show any signs of combat. From the actions of these two animals I base my belief that the wolverine will, under any ordinary circumstances, give way to the presence of man.

It was on the morning of August 31, 1905, that I came upon my first wolverine in the free state of his existence at the eastern edge of Giant Forest on the Alta trail, elevation 7500 feet. The animal was a very large one and was busily engaged in an effort to dig a "ground hog" from an embankment a few feet off the trail. He was making rapid progress. So determined was the animal in the pursuit of his quarry that not until I had approached within less than forty feet did he notice my presence; and when he saw me in such proximity it gave him a great shock of surprise and amazement such as he had perhaps never before had in his life—as was clearly demonstrated by his actions. He immediately sprang upon a large fir log at the butt of which I was standing and turned facing me, gave a coarse guttural growl and showed his teeth. His small, black, beadlike eyes were focused directly at my countenance as if to detect any signs of hostility. His nose was then hoisted high in the air as if to determine the unusual scent; the ears, which with respect to size and shape, resembled two silver dollars, stood well out from the head as if to grasp any unusual sound; the white, pearly claws of the front feet were occasionally scratched on the bark of the log as if preparing for immediate use in warfare.

After remaining in this statuesque attitude for some five minutes the beast advanced slowly on the log toward me and looked me direct in the face. When he had approached within about fifteen feet he suddenly stopped as if to collect his philosophical mind in reasoning out a proposition where death threatened him. His advance seemed for the purpose of getting a better look at me in order to ascertain more accurately as to just what sort of a being I was, or whether or not I was a hostile genus or hereditary enemy, for he showed no signs of anger, fear or aggression. However, at that very critical moment I had my pistol leveled at his heart and my finger on the trigger, with the expectation of matching my skill in marksmanship against his temper and grit in case he showed evidence of combat. He stood for a few seconds scrutinizing me from head to foot, then began to retreat by walking backwards on the log whence he came, for a distance of some thirty feet, sprang to the ground and departed in the forest. I followed the animal for a distance of some two hundred yards, but all the while he kept his distance and close watch of me by looking back over his shoulders. On three different occasions I stamped my feet rapidly on the ground as if in running pursuit, and on each occasion he would immediately right-about-face and advance a few steps toward me. Having amused myself after this fashion for some few minutes, the animal was permitted to go his own way into the depths of the forest.

The second wolverine I met was on the afternoon of July 30, 1906, at Buck Canyon, seven miles east of Giant Forest, elevation 7800 feet. This was the same animal to which I have referred as having driven two bears away from a carcass. Two men and myself in hiding some 150 feet away watched this affair without any of the animals detecting our presence. After the fracas had ended between the three animals and the wolverine was in possession of the carcass, I decided to make a test as to whether or not he would yield on my approach. I shifted my position by crawling a few paces to a huge boulder that stood within about fifty feet of him and between us. I then crawled up to the boulder, peeped round one side, and for a few moments watched his method of repast. The bears had left little but large bones which they were unable to chew; however, the wolverine crushed these as if they were mere chalk and swallowed them with rapacious delight. After watching the animal for some five minutes, pistol in hand, I stepped out in plain sight and advanced slowly toward him. The wolverine looked up at me, gave a coarse growl, grabbed a large bone in his mouth, then walked slowly into the depths of a dense cherry thicket.

Do Wolverines Climb Trees?

The question is often asked: "Do wolverines climb trees?" To this I would say that never have I seen wolverines climb trees, but I have a verified record of such.

The occurrence took place during the month of May, 1903, at Mineral King, California. Two forest rangers, Clarence W. Fry, Three Rivers, California, and William A. Hindman, Visalia, California, came suddenly upon a wolverine that climbed trees, and without hesitation. The animal, when first routed from its lair, gave a few jumps, climbed up a large fir tree some thirty feet, then backed to the ground quickly. When the animal reached the ground, upon being pursued closely by both men and a dog, it climbed up a second large fir tree a distance of some sixty feet, at which point it was shot and killed by Ranger Fry.

Breeding Habits.

Little is known about the breeding habits of the wolverine. It is supposed that young are born in June and range from one to four in number. Upon two occasions I have come upon beds in Sequoia National Park where young had been born and reared, as was plainly evidenced by the premises and surroundings. The first was found on the north spur of Mount Silliman on September 10, 1909, elevation 10,800 feet. The second was on the south side of Vandever Mountain on September 18, 1918, elevation 11,000 feet. In both cases the choice for beds or dens was under shelving rocks and but little preparation had been made for the occasion. A round-like excavation some six inches in depth and five feet in width, with scant lining of grasses and small pieces of pine boughs, comprised the whole. The strange feature of both lairs found was that no bones of the animals that had fallen victim of their prey could be found, as is always the case in such instances with the lion, bear, fox, wolf and lynx. No doubt these had been consumed by the parent mother as food, or carried away for some distance.

In all my mountain experience I have never yet heard a wolverine, when captured or otherwise, give voice to anything but a coarse, guttural growl. Perhaps through long experience they know the value of silence and prefer to keep secret their general whereabouts.

The wolverine is an animal endowed by nature with the strongest of constitution, philosophical mind and excellent reasoning power. Had this not been the case the species could not, with its many handicaps, have survived to this time. The wolverine's sense of smell and hearing is fair but his vision is short and his shape such that he is a poor runner. They do not hibernate in winter, as do the bear, but are forced to hunt daily for their living. Neither do they migrate to lowlands during deep snow periods in winter, as do many other animals, but brave the storm-swept elements on upper timber line where it would seem that no living thing could exist.

Should the Wolverine Be Protected or Exterminated?

The wolverine forms one of the most interesting members of California's fauna and steps should be taken for its immediate protection. Its extermination, to me, seems a very serious crime in which man will be held to strict accountability. Furthermore, I believe that these animals have played an important part in helping to save the larger game animals during attacks of contagious diseases by consuming as food the dead and sick animals, thus preventing spread of the contagion.

So the question now at issue is, "Is the wolverine worth while?" If so, it should be protected. If the wolverine is not worth preserving, at its present rate of extinction it will soon go down and out and will pass to join in history the mastodon and mammoth of the past.

NOTES ON THE EGG YIELD OF SACRAMENTO RIVER KING SALMON.

By E. A. McGregor.

Last year the writer prepared a report on the egg yield of Klamath River king salmon.[1] The present paper continues this study as applied to 50 female king salmon taken in the Suisun portion of the Sacramento system.

The method of computing the number of ova has been the same in all of these studies, namely, careful weighing of the ovaries, determining the number of ova per 10 grams, and then calculating the total number. This method is really accurate enough for all purposes.

[1] "Observations on the Egg Yield of Klamath River King Salmon," California Fish and Game, Vol. 8, No. 3.

TABLE No. 1. Analysis of 50 King Salmon Females as to Length and Ovary Characteristics.

Fish number		Weight, left ovary, grams	Weight, right ovary, grams	Eggs in left ovary	Eggs in right ovary	Total egg count	Length of fish, cm.
1		104	113	2,309	2,486	4,795	95
2		226	224	2,599	2,554	5,153	78
3		254	298	2,438	2,891	5,329	98
4		71	60	2,812	2,586	5,398	59
5		230	215	2,898	2,666	5,564	87
6		204	219	2,652	2,935	5,587	82
7		211	216	2,870	2,938	5,808	82
8		311	278	3,110	2,780	5,890	94
9		119	120	2,999	2,940	5,939	72
10		340	367	2,822	3,156	5,978	96
11		351	279	3,475	2,734	6,209	92
12		269	271	3,201	3,144	6,345	90
13		157	178	2,983	3,364	6,347	87
14		427	463	3,160	3,426	6,586	88
15		566	520	3,396	3,224	6,620	97
16		273	260	3,385	3,250	6,635	82
17		417	418	3,419	3,219	6,638	94
18		580	505	3,654	3,182	6,836	101
19		175	156	3,640	3,245	6,885	98
20		448	411	3,494	3,411	6,905	101
21		338	313	3,617	3,349	6,966	93
22		201	197	3,517	3,526	7,043	81
23		283	270	3,594	3,483	7,077	88
24		301	356	3,191	4,023	7,214	87
25		404	433	3,474	3,767	7,241	96
26		311	295	3,639	3,717	7,356	91
27		446	468	3,613	3,791	7,404	100
28		372	402	3,683	4,020	7,703	95
29		583	632	3,731	4,045	7,776	103
30		571	666	3,597	4,264	7,861	99
31		603	658	3,859	4,277	8,136	101
32		562	582	4,215	4,016	8,231	97
33		478	476	4,159	4,141	8,300	99
34		513	519	4,155	4,152	8,307	99
35		170	209	3,910	4,410	8,320	86
36		437	417	4,326	4,003	8,329	99
37		438	376	4,687	3,647	8,334	99
38		590	553	4,366	4,092	8,458	97
39		595	515	4,641	3,863	8,504	103
40		661	683	4,230	4,303	8,533	100
41		514	514	4,215	4,369	8,584	100
42		513	472	4,566	4,201	8,767	100
43		595	444	4,777	4,085	8,862	102
44		555	543	4,551	4,398	8,949	106
45		674	693	4,447	4,524	8,971	99
46		382	396	4,431	4,594	9,025	97
47		884	873	4,685	4,627	9,312	110
48		360	389	4,500	5,018	9,518	99
49		150	155	4,845	4,774	9,619	72
50		457	498	5,484	5,528	11,012	88
	Average					7,422	

The present series (see Table 1) varies from 4795 to 11,012—a range of 6217, with a mean value of 7422. Twenty-seven fish had more ova in the left ovary while 23 fish had a greater number in the right ovary. This agrees with the condition found by Snyder to obtain with his Klamath River series, but is the reverse of the writer's findings with his ovary counts from the Klamath. Evidently neither ovary consistently exceeds in the number of ova.

Figure 31 presents a frequency chart in which are indicated the egg counts of the 98 king salmon from the Klamath River (previously treated in the above cited paper) as well as the egg counts of the present

series. Thus Klamath River and Sacramento River data are plotted side by side. The class interval is 200 eggs.

It is of great interest to note that the respective graphs (Klamath and Sacramento) each constitute, in the main, compact "curves," well defined from each other. The Klamath group is somewhat more symmetrical, probably owing to the presence of about double the number of cases. Doubtless a more symmetrical "curve" would have resulted in the case of the Sacramento data had we been in a position to chart twice the number of cases.

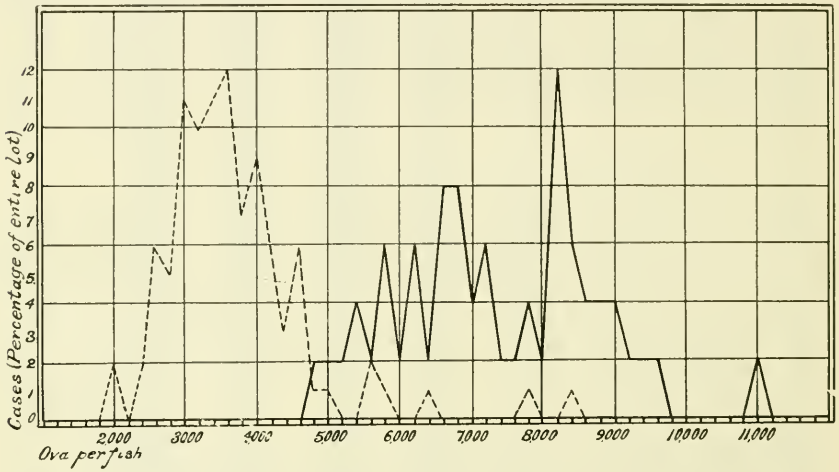

FIG. 31. Graph showing frequency distribution of the total egg counts in a collection of 98 king salmon from the Klamath River and a collection of 50 king salmon from the Sacramento River. (The horizontal ordinates represent percentages of the entire number of cases; the broken lines form the Klamath "curve"; the solid lines form the Sacramento "curve.")

In this connection it is pertinent to quote from our earlier paper:

> There are four or five cases which do not conform nicely with the mass distribution of the series (Klamath). Concerning these aberrant cases, all we can offer by way of explanation is that it is barely possible that these fishes belong to a race or races of salmon alien to the Klamath River or to unusual races native to the Klamath River. If the former hypothesis be true they may be either "stragglers" or fish that have become established through the transplantation to the Klamath system of eggs from other streams.

A glance at figure 31 shows how nicely the above aberrant cases of the Klamath series coincide with the distribution of the Sacramento series. It is quite probable that these cases were in reality typical fish of the Sacramento race.

The mean value for the Sacramento egg counts, as already stated, is 7422 as opposed to 3891 for the mean of the Klamath series. However, the most outstanding feature to be detected through a comparison of the egg counts of the two river races is that there is almost no overlapping of the two series. Where one ends the other begins. Hence, it seems safe in stating that a salmon in the Klamath River with over 5000 ova is very possibly a Sacramento River fish; while a salmon in the Sacramento River with less than 4800 ova is probably alien to that stream, and quite possibly of the Klamath race.

As in the case of the Klamath ova studies, described in the earlier paper, so with the present series, there appears to be a correlation between the length of the fish and the number of ova. The third of the series with the fewest eggs average 92.4 cm. in length; the middle third average 93.8 cm.; while the third with the most eggs average 96.9 cm. in length.

Concerning the possibility of a relation between age and number of ova, little could be established with our material since the scales of some of the fish had commenced to become absorbed, making age determination impractical in such cases.

Certain workers have previously expressed the opinion that the Sacramento salmon exceeds in number of ova per fish that of the Klamath salmon. The results of the present studies compared with those reported in the 1921 paper establish the validity of these hitherto unproven views.

An interesting outgrowth of these studies is the quite obvious discrepancy between our data on the number of eggs per fish and similar estimates by the hatchery authorities. A hatchery analysis of the egg take at Klamathon for 1921 is as follows: Total females spawned, 5823; total eggs therefrom, 19,178,000; average number of ova per female, 3293. It has been seen that our data yields a mean ova value per female of 3891 for the Klamath race, the mode being at 3600 approximately. This means that we find about 18 per cent more eggs per female among fish of the spawning run at Requa (near mouth of river) than are spawned at the racks—based on hatchery estimates. Again, we are told that the records of the Battle Creek Hatchery, together with other evidence, show that the Sacramento salmon yields an average of about 6000 spawned ova per female. As we have stated, our careful counts indicate a mean value of 7453 eggs per set of ovaries for females from the Suisun district of the Sacramento system. This represents about 24 per cent more ova among fish of the spawning run near Martinez than are secured at the Battle Creek egg-taking station.

Just how to account for these discrepancies in egg counts a short time prior to and at spawning time is problematical. The theory might be advanced that, contained in the ovaries are certain ova, smaller than the general mass of ova, that become absorbed prior to spawning. It must be admitted that a small proportion of the ovaries examined have contained a negligible number of abortive ova, but an effort was made to eliminate these few undeveloped eggs from our estimates. Since absorption of these abortive ova presumably would advance (provided absorption occurs) with the maturing of the general mass of eggs, one would therefore expect (on this hypothesis) ovaries with further advanced eggs to exhibit, in general, egg counts somewhat less than the average for a given lot. On the contrary, as may seem strange, of that portion of the females containing eggs in excess of the mean number, about 75 per cent possessed eggs averaging larger than the average size of the entire lot. Consequently we are forced to the conclusion that the phenomenon of egg absorption does not operate to reduce the number of ova just prior to spawning.

We will leave the solution of this discrepancy between egg counts and egg estimates for a later problem.

In conclusion then, our studies indicate a very marked difference between the number of eggs developed by king salmon females of the Klamath and Sacramento races, respectively. Taking the weighted means as representative of the egg yields of the two river races (3891 and 7422), the number of eggs per female of the Sacramento type may be said to exceed that of the Klamath type by about 91 per cent of the Klamath yield.

As previously pointed out, these facts possess an economic bearing which may be utilized in practice at some later date.

A POSSIBLE SEPARATION OF THE RIVER RACES OF KING SALMON IN OCEAN-CAUGHT FISH BY MEANS OF ANATOMICAL CHARACTERS.

By E. A. McGregor.

In connection with certain studies of rather ample series of gill rakers, pyloric coeca, branchiostegals and ova, and a limited number of vertebrae, some very suggestive developments have accrued which appear to bear vitally on the problem of the race analysis of ocean-captured salmon.

In the work of systematists, dealing previously with the Pacific coast salmon species, seemingly they have not had access to large series of specimens or, if they had, possibly they did not go to the trouble of tediously counting large series of the structures listed above. Consequently the ranges in their several series are not so great as might have been, and their data appear not to have aroused serious speculation as to the existence of well defined intraspecific racial differences. Recent studies by Dr. Chas. H. Gilbert, especially in the case of the sockeye salmon, have established the occurrence of several local races in British Columbia and Alaska.

In the following pages we shall attempt to present the data accumulated to date in such a way as to be useful in the future in connection with similar analytical studies of ocean-caught salmon.

Ova Counts.

In another paper[1] the writer has presented data emphasizing the marked difference in the number of ova as between the Klamath River and Sacramento River races of king salmon. Since preparing this paper we have added somewhat to our Klamath series, so we will again present the ova counts of the two races, bringing the comparisons up to date.

Table I presents the full series, consisting of 111 Klamath River king salmon. These were collected at three different times as follows: Those designated "S" were collected by Professor Snyder at Requa in 1920; those marked "R" were collected by the writer at Requa in 1921; those listed as "K" were collected by the writer at Klamathon (towards the head of the river) in 1922.

[1] "Notes on the egg yield of Sacramento River king salmon" (in the present number of California Fish and Game).

TABLE I. KING SALMON OVA COUNTS, KLAMATH RIVER.

No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date
R 8406	105	Sept. 1	R 3953	90	Aug. 24	R 3298	74	Aug. 27
R 7946	95	Sept. 5	S 3935	84	Aug. 12	R 3277	100	Sept. 2
R 6468	79	Sept. 2	R 3932	81	Aug. 27	K 3265	71	Oct. 17
R 5975	107	Sept. 3	R 3905	86	Aug. 18	R 3256	86	Aug. 12
R 5658	105	Sept. 6	R 3901	81	Sept. 1	S 3200	82	Aug. 12
R 5656	91	Aug. 9	S 3886	78	Aug. 12	R 3181	69	Aug. 19
R 5159	100	Sept. 3	K 3792	83	Oct. 19	R 3175	84	Aug. 31
K 4977	--------	Oct. 20	S 3781	82	Aug. 11	K 3174	80	Oct. 12
S 4842	87	Aug. 12	R 3743	87	Sept. 2	R 3139	70	Sept. 1
R 4728	93	Aug. 25	S 3731	84	Aug. 11	K 3130	--------	Oct. 20
R 4713	92	Aug. 20	R 3707	84	Aug. 26	S 3110	84	Aug. 11
R 4692	92	Aug. 22	K 3702	81	Oct. 20	R 3101	80	Aug. 24
R 4666	92	Aug. 26	S 3676	83	Aug. 12	S 3083	80	----------
R 4650	90	Aug. 27	S 3672	81	Aug. 12	R 3075	77	Aug. 20
R 4612	95	Sept. 1	R 3645	69	Aug. 12	R 3070	76	Aug. 24
R 4586	89	Aug. 15	S 3630	83	Aug. 12	K 3057	73	Oct. 12
K 4544	86	Oct. 15	R 3625	70	Aug. 20	R 3046	81	Sept. 6
K 4479	84	Oct. 15	R 3623	88	Aug. 25	R 3046	71	Aug. 22
R 4452	--------	----------	S 3614	83	----------	R 3035	--------	----------
R 4429	91	Aug. 9	R 3613	81	Aug. 15	R 2973	68	Aug. 16
R 4399	94	Aug. 16	R 3593	86	Aug. 24	S 2949	77	Aug. 12
S 4392	87	Aug. 12	S 3586	75	Aug. 12	K 2944	72	Oct. 12
R 4322	69	Aug. 1	S 3579	69	Aug. 12	S 2879	72	Aug. 12
R 4305	91	Aug. 18	R 3553	78	Aug. 31	S 2847	77	Aug. 12
S 4300	82	Aug. 12	R 3537	75	Aug. 18	R 2823	70	Aug. 24
S 4200	87	----------	R 3523	82	Aug. 25	K 2830	75	Oct. 15
S 4197	77	Aug. 12	R 3486	91	Aug. 31	S 2745	80	Aug. 12
S 4192	83	Aug. 12	S 3467	81	Aug. 12	R 2738	73	Aug. 31
R 4190	79	Aug. 19	R 3446	88	Sept. 3	S 2700	79	Aug. 12
R 4168	86	Aug. 16	R 3413	71	Sept. 5	R 2695	85	Aug. 16
R 4155	89	Aug. 26	S 3403	79	Aug. 12	R 2632	68	Aug. 15
R 4150	80	Sept. 5	R 3373	73	Aug. 16	R 2601	66	Sept. 2
S 4117	95	Aug. 12	R 3360	71	Aug. 26	R 2501	61	Aug. 12
R 4061	--------	----------	R 3347	77	Aug. 4	R 2471	65	Aug. 27
K 4039	84	Oct. 17	S 3305	71	Aug. 12	S 2146	67	Aug. 28
S 4009	80	---------	R 3305	66	Aug. 18	R 2013	92	Aug. 15
R 3994	93	Aug. 19--	R 3303	86	Aug. 19	K 1718	55	Oct. 13

Mean value, 3760 ova.

It will be noted that there is a wide range in the number of ova, namely, from 1718 to 8406 per female. The computed mean value for the series is found to be 3760 ova. It is not unlikely that a more detailed study of the Klamath River salmon may demonstrate the existence of several more or less recognizable local subraces characteristic of certain tributaries.

It will be further noted that the seven individuals at the maximum extreme of the series constitute (with a single exception) a homogeneous group. All but one returned to the stream during September and all, with one exception, were very large females. As will be seen later, evidence would seem to indicate that the females with over 5000 ova (although taken in the Klamath River) may be of the Sacramento race.

Table II presents our available data dealing with the ova counts of 50 king salmon of the Sacramento system, taken at Martinez, September, 1922.

Here too, we find the existence of a remarkably large range in the number of ova per female. The extremes were, respectively, 4795 and 11,012 ova per female. The computed mean for this series was found to be 7454 ova, almost double the mean of the Klamath series. As we have surmised regarding the Klamath River salmon, so also with the Sacramento run, it is quite likely that more exhaustive studies of the

salmon of this river may bring to light the occurrence of several local subraces.

TABLE II. KING SALMON OVA COUNTS, SACRAMENTO RIVER.

No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date
11,012	88	Sept. 6	8300	99	Sept. 6	6635	82	Sept. 6
9619	72	Sept. 7	8231	97	Sept. 6	6620	97	Sept. 6
9518	99	Sept. 6	8136	101	Sept. 6	6586	88	Sept. 6
9312	110	Sept. 7	7861	69	Sept. 6	6347	87	Sept. 6
9025	97	Sept. 7	7776	103	Sept. 6	6345	90	Sept. 6
8971	99	Sept. 7	7703	95	Sept. 6	6209	92	Sept. 6
8949	106	Sept. 6	7404	100	Sept. 6	5978	96	Sept. 6
8862	102	Sept. 6	7356	91	Sept. 6	5939	72	Sept. 6
8767	100	Sept. 7	7241	96	Sept. 6	5890	94	Sept. 7
8584	100	Sept. 7	7214	87	Sept. 6	5808	82	Sept. 6
8533	100	Sept. 6	7077	88	Sept. 6	5587	82	Sept. 7
8504	103	Sept. 7	7043	81	Sept. 6	5564	87	Sept. 6
8458	97	Sept. 6	6966	93	Sept. 6	5398	59	Sept. 6
8334	99	Sept. 6	6905	101	Sept. 7	5329	98	Sept. 6
8329	90	Sept. 6	6885	98	Sept. 6	5153	78	Sept. 6
8320	86	Sept. 7	6836	101	Sept. 7	4795	95	Sept. 6
8307	99	Sept. 6	6638	94	Sept. 7			

Mean value, 7453.8.

Table III contains the ova counts from 58 king salmon taken by troll in the ocean off Noyo River and Shelter Cove, Mendocino County, during the period from June 21 to August 12, 1922.

TABLE III. KING SALMON OVA COUNTS, FORT BRAGG—1922.

No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date	No. of ova	Length, cm.	Date
9021	79	June 23	5093	83	July 8	3910	66	June 25
8829	73	June 24	5042	81	June 23	3867	77	June 22
8258	70	July 6	4960	88	July 1	3854	80	July 10
7618	95	Aug. 11	4858	82	June 26	3646	81	June 25
7272	67	June 26	4783	88	June 26	3614	76	June 22
7068	77	July 1	4729	83	June 27	3555	82	July 8
6917	77	July 1	4621	85	June 23	3526	93	June 29
6851	78	June 28	4437	83	June 23	3521	77	June 27
6715	85	June 21	4377	75	June 23	3497	78	June 21
6358	109	June 29	4330	75	June 26	3477	73	July 7
6309	77	June 23	4297	98	July 1	3487	79	June 27
6287	90	Aug. 5	4247	98	July 26	3390	78	July 10
6269	61	June 27	4148	74	July 20	3344		
6192	79	June 22	4142			3321	94	June 21
6008	76	July 3	4062	87	June 26	3317	75	June 30
5972	58	June 25	4035	78	June 22	3266		
5768	93	Aug. 12	4033	76	June 26	3214		
5450	78	June 23	4018			3147	78	June 27
5370	88	June 26	4008	81	June 29			
5094	72	July 1	3988	98	June 21			

Mean value, 4910 ova.

Again we note a very considerable range, namely, from 3147 to 9021 ova per female. The mean is computed to be 4910.

In figure 32 we have constructed three "curves" based on the data contained in tables I, II and III. In these graphs the data have been recorded in terms of percentage rather than of absolute values. A few very significant facts are to be deduced from the presentation of our data in this manner.

Referring to figure 32 it is at once noticeable that the "curves" representing respectively the Klamath and Sacramento ova series are quite

distinct from one another. Were we to ignore the six aberrant cases of the Klamath series (referred to above as probably belonging to the Sacramento race), we might say there were little, if indeed any, overlapping of the two "curves." The cleavage between the two series would appear to be coincident approximately with the 5200 ordinate.

A third "curve" will be noted in figure 32. This is constructed from the data embracing the ova counts of the series of king salmon females

FIG. 32. Graph comparing number of ova per fish in Fort Bragg, Klamath and Sacramento series of salmon.

from the ocean at Fort Bragg. This "curve" is plotted in direct relation with the "curves" of the Klamath and Sacramento series. When considered together, we find that the ocean "curve" is nearly coextensive with the combined Klamath and Sacramento "curves." Corresponding with the cleavage between the series of the two rivers there is seen to be similarly a fairly well defined cleavage at the 5200 ordinate of the Fort Bragg "curve." Below the cleavage there are 41 cases; above the cleavage, 17 cases.

It is possible, of course, that there may be represented in the Fort Bragg series salmon from streams other than the Sacramento and Klamath Rivers. It seems, however, quite reasonable to presume that the great majority of king salmon occurring off Fort Bragg belong to the two California streams which support the major runs of the state. If this supposition be true, our ova data would seem to justify the rough estimate that 70 per cent of the king salmon caught off Fort Bragg and Shelter Cove during the period of our observations in 1922 were of the Klamath race while only 30 per cent of these sea-caught fish were of the Sacramento race. It should again be emphasized that our data from Fort Bragg were collected at various dates, representing fairly well the major portion of the fishing season at that locality.

One might attempt a more refined interpretation of the several "curves" than we have done. The depression of the Sacramento "curve" at about the 7500 ordinate may or may not be significant. It is quite possible that accessibility to a larger series of individuals might obliterate this apparent cleavage. Should a depression of the "curve" at this point persist with the study of a very large series of ova, it would indicate strongly the occurrence in the Sacramento River system of at least two races of salmon with rather distinct ova count values. It may indicate a demarkation between Sacramento and San Joaquin River fish.

TABLE IV. PYLORIC COECA DATA FROM KLAMATH RIVER KING SALMON.

Number of coeca	Average length of 3 longest, cm.	Length of fish, cm.	Date	Locality	Number of coeca	Average length of 3 longest, cm.	Length of fish, cm.	Date	Locality
193	5.9	67.5	Oct. 10, 1919	R	131	8.3	92.5	Oct. 8, 1919	R
187	4.7	60.0	Oct. 11, 1919	R	130	3.7	83.0	Oct. 13, 1922	K
164	7.3	87.0	Oct. 7, 1919	R	130	3.2	82.0	Oct. 12, 1922	K
153	5.4	-------	Aug. 28, 1919	R	130	4.3	53.0	July 30, 1920	R
152	11.0	-------	Aug. 28, 1919	R	128	7.5	-------	Aug. 28, 1919	R
152	8.9	-------	Aug. 28, 1919	R	128	10.5	103.0	Oct. 14, 1919	R
151	7.5	-------	Aug. 28, 1919	R	128	7.5	83.5	Oct. 14, 1919	R
151	7.3	-------	Aug. 28, 1919	R	127	6.9	-------	Aug. 28, 1919	R
150	16.5	-------	-------	R	127	4.5	-------	Oct. 14, 1919	R
149	3.4	81.0	Oct. 20, 1922	K	127	4.3	73.0	Oct. 16, 1922	K
148	6.1	-------	Aug. 28, 1919	R	127	3.5	68.0	Oct. 13, 1922	K
148	9.7	-------	Aug. 28, 1919	R	125	9.1	-------	Aug. 28, 1919	R
148	7.9	-------	-------	R	125	9.4	-------	Aug. 28, 1919	R
146	3.2	82.0	Oct. 13, 1922	K	124	4.4	84.0	Oct. 13, 1922	K
145	2.9	77.0	Oct. 13, 1922	K	124	4.4	86.0	Oct. 15, 1922	K
144	9.2	-------	Aug. 28, 1919	R	124	3.2	74.0	Oct. 13, 1922	K
144	8.7	94.5	Oct. 6, 1919	R	124	7.7	-------	Aug. 28, 1919	R
144	5.8	63.5	Oct. 6, 1919	R	123	5.9	55.0	July 30, 1920	R
144	8.3	97.5	Oct. 7, 1919	R	122	8.5	-------	Aug. 28, 1919	R
142	8.1	-------	Aug. 28, 1919	R	121	8.3	-------	Aug. 28, 1919	R
142	2.7	73.0	Oct. 12, 1922	K	119	7.6	-------	Aug. 28, 1919	R
141	7.1	-------	Aug. 28, 1919	R	119	2.1	52.0	Oct. 14, 1922	K
140	2.8	78.0	Oct. 12, 1922	K	119	2.8	77.0	Oct. 16, 1922	K
138	3.0	96.0	Oct. 12, 1922	K	118	3.6	83.0	Oct. 12, 1922	K
136	7.1	60.0	Aug. 4, 1920	R	117	4.3	41.5	Oct. 6, 1919	R
135	8.7	93.0	Oct. 7, 1919	R	116	6.4	-------	Aug. 28, 1919	R
135	8.0	104.0	Oct. 14, 1919	R	114	2.2	80.0	Oct. 16, 1922	K
135	2.8	81.0	Oct. 13, 1922	K	114	6.5	56.5	Oct. 11, 1919	R
134	8.8	-------	Aug. 28, 1919	R	109	-------	81.0	Oct. 12, 1922	K
133	5.8	-------	Aug. 28, 1919	R	108	5.0	-------	Oct. 14, 1919	R
133	3.6	76.0	Oct. 13, 1922	K	107	4.3	82.0	Oct. 12, 1922	K
133	4.6	84.0	Oct. 17, 1922	K	102	-------	55.0	Oct. 13, 1922	K
132	12.1	97.5	Oct. 14, 1919	R	93	4.2	-------	Oct. 20, 1922	K

Average 132.2.

Pyloric Coeca Counts.

We have made also a good many counts of pyloric coeca from the stomachs of king salmon taken at various localities.

A series of 66 king salmon stomachs were collected on the Klamath River and later examined. These were all from mature fish on their spawning run. Forty-two were taken in the estuary at the mouth of the river, the balance, 24, were collected at the Klamath racks, 170 miles upstream from the coast.

TABLE V. PYLORIC COECA DATA FROM SACRAMENTO RIVER KING SALMON.

Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date	Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date
214	7.7	98	Sept. 6	177	7.1	88	Sept. 6
208	9.7	95	Sept. 6	177	7.5	82	Sept. 6
206	4.6	64	Sept. 7	176	4.6	64	Sept. 6
205	2.8			176	8.1	91	Sept. 6
205	4.4	67	Sept. 6	175	6.0	101	Sept. 7
203	9.2	100	Sept. 7	175	9.7	117	Sept. 6
203	5.6	98	Sept. 6	174	9.2	98	Sept. 7
200	11.7	116	Sept. 6	174	6.7	90	Sept. 6
199	8.6	93	Sept. 7	174	6.2	81	Sept. 6
198	8.0	82	Sept. 7	174	10.5	101	Sept. 6
198	9.4	106	Sept. 6	168	7.9	99	Sept. 6
197	6.8	72	Sept. 7	168	6.8	79	Sept. 6
197	8.8	88	Sept. 6	168	6.8	90	Sept. 6
195	7.8	78	Sept. 7	166	8.9	101	Sept. 6
195		88	Sept. 6	165	8.1	99	Sept. 6
[1]195	3.3	84	Nov. 10	165	6.3	92	Sept. 6
194	4.5	57	Sept. 7	164	9.2	87	Sept. 6
194	7.8	97	Sept. 6	163	8.9	103	Sept. 6
193	7.0	94	Sept. 7	164	8.1	88	Sept. 6
[1]193				162	8.1	87	Sept. 6
192	7.3	100	Sept. 7	162	7.1	97	Sept. 6
192	10.0	95	Sept. 5	[1]162	3.0	68	Nov. 8
192	6.2	67	Sept. 6	161	8.2	97	Sept. 6
192	9.4	80	Sept. 6	160	9.4	101	Sept. 7
[1]191	3.8	86	Nov. 11	158	10.5	96	Sept. 6
189	7.9	98	Sept. 6	157	6.3	97	Sept. 6
188	6.5	100	Sept. 6	156	6.4	69	Sept. 6
187	8.3	87	Sept. 6	155	8.9	114	Sept. 7
187	7.2	100	Sept. 6	[1]155	4.3	84	Nov. 3
[1]187				150	6.8	97	Sept. 6
186	8.8	99	Sept. 6	149	5.6	78	Sept. 6
184	6.7	97	Sept. 7	149	8.2	99	Sept. 6
183	8.1	99	Sept. 7	147	8.4	99	Sept. 6
[1]182	2.8	80	Nov. 8	147	10.0	84	Sept. 6
181	8.3	103	Sept. 7	146	5.7	62	Sept. 6
181	7.2	90	Sept. 6	145	9.8	110	Sept. 7
180	8.4	69	Sept. 6	140	7.9	72	Sept. 6
178	7.3	94	Sept. 7	136	7.3	86	Sept. 7
178	9.2	83	Sept. 6	135	9.0	103	Sept. 7
178	9.4	82	Sept. 6	134	4.5	59	Sept. 6
177	8.0	99	Sept. 6				

Average, 176.4.

[1]NOTE.—The few individuals of November in this table were taken at the Klamathon racks on the Klamath River; being marked fish we know them to be of Sacramento River origin and are included with the balance which were taken at Martinez.

The frequency range of this Klamath River series (see Table IV) is from 93 to 193 coeca per stomach, with a mean value of 132.2 coeca. The three highest counts (164, 187 and 193) appear to fall far out of the regular distribution of the series. This is shown more clearly by referring to the graphic plotting of the data in figure 33. It is very probable that these three aberrant cases are individuals belonging to a race other than that normally inhabiting the Klamath River. We have computed that about 93 per cent of all the coeca cases of the Klamath series are contained between the 107 and the 153 ordinates, inclusive.

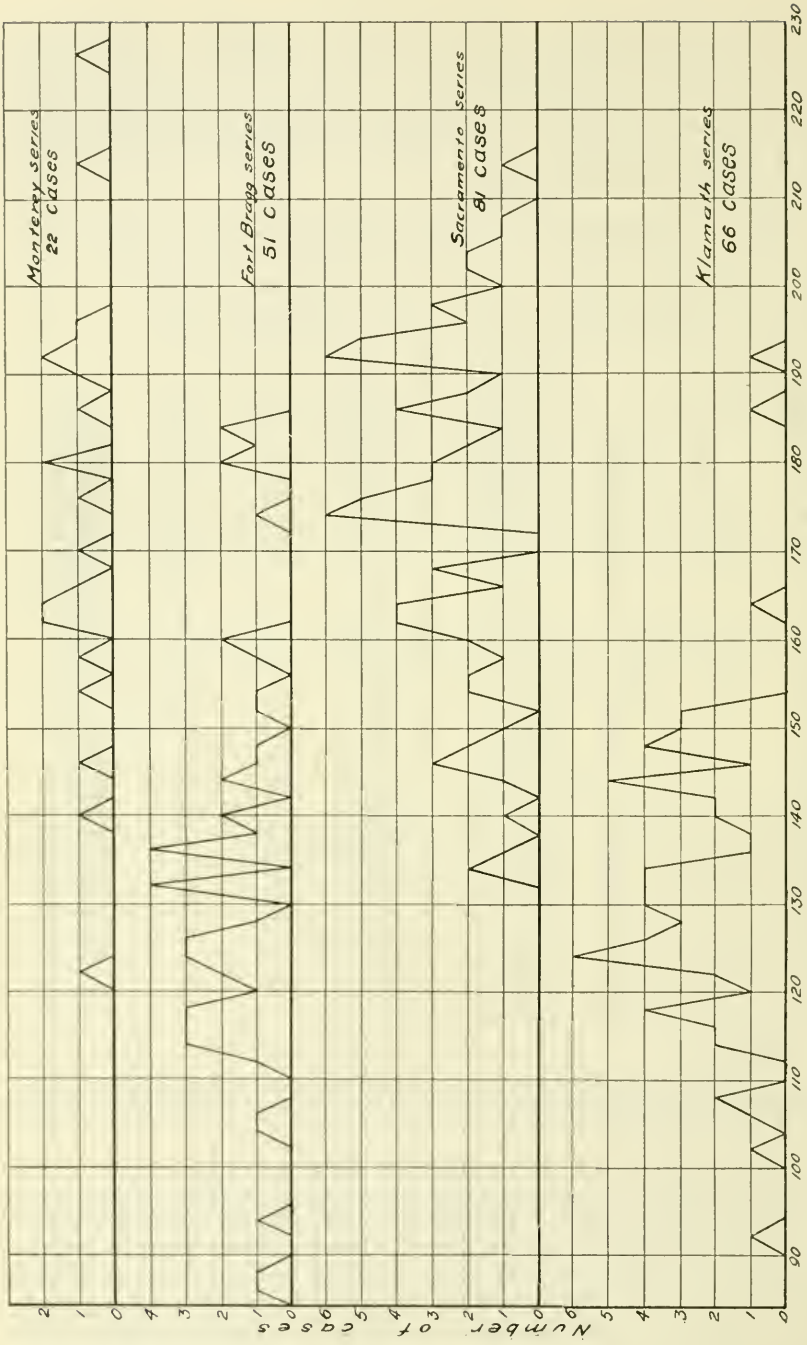

FIG. 33. Comparison of number of coeca in Monterey, Fort Bragg, Sacramento and Klamath series of salmon.

A series of 81 king salmon stomachs were collected at Martinez on Suisun Bay, just below the mouth of the Sacramento River. While there is a possibility that a portion of these individuals may have been heading for the San Joaquin River, still it is more than likely that the great mass, if not all of them, were typical Sacramento River fish and we shall speak of them as such in the present paper.

In Table V we present the coeca counts of this series arranged in orderly sequence. It will be seen that the case distribution ranges from 134 to 214 coeca (about 95 per cent of all the cases occur on the upper side of the 144 ordinate). The mean value for the series is 176.4 coeca.

Referring again to figure 33 we see the coeca counts of the Sacramento River series plotted in relation to the Klamath River counts. As one might expect, there is a degree of overlapping of the "curves" representing the coeca counts of the two great river systems. The striking feature, however, is that the overlapping is so slight! If, arbitrarily, we erect a vertical between the 153 and 154 ordinates, the Sacramento cases below this division line constitute but 13.5 per cent of the entire Martinez lot, while the Klamath cases above this dividing line amount to only 4.5 per cent of all the Klamath River cases. And, as we have suggested above, some of these overlapping cases probably represent straggling individuals from the stream within whose coeca series they appear to fall. Hence, if we could definitely eliminate these disconcerting cases it would be seen that the pyloric coeca values of the Klamath and Sacramento rivers would become strikingly distinct from one another. As it is, they are sufficiently well separated.

We now will consider the coeca counts of king salmon taken by troll in the ocean off Fort Bragg, Mendocino County. In this series there are 51 cases, ranging from 87 to 185 coeca, with the mean value at 134.1 coeca (see Table VI).

TABLE VI. PYLORIC COECA DATA FROM FORT BRAGG KING SALMON.

Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date	Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date
			1922	132	5.6	41	July 10
185	11.6	78	June 23	129	13.5	82	June 26
185	4.5	----------	----------	127	11.0	76	July 3
182	8.4	78	June 28	126	10.3	77	July 1
180	12.2	109	June 29	126	11.1	83	June 23
180	9.7	77	June 23	125	14.1	93	Aug. 12
174	11.4	78	July 20	125	11.9	77	July 1
161	----------	79	June 23	124	11.6	85	June 23
160	9.0	81	June 23	123	10.3	77	June 22
158	12.0	----------	----------	123	13.5	90	Aug. 5
155	7.8	70	July 6	121	13.8	88	Aug. 2
152	13.4	----------	----------	119	10.0	75	June 23
149	9.0	61	June 27	118	12.4	76	June 26
146	8.5	79	June 22	118	11.1	86	July 19
144	9.5	74	June 20	117	11.1	67	June 26
144	8.2	66	June 25	117	11.7	----------	----------
141	11.1	72	July 1	116	11.5	88	June 26
140	9.8	79	Aug. 2	115	9.5	77	June 27
138	9.5	79	June 27	114	12.2	78	June 27
136	11.3	78	June 21	114	10.3	81	June 29
136	12.7	85	June 21	112	----------	81	June 25
136	7.5	58	June 25	107	13.3	75	June 26
136	13.3	95	Aug. 11	105	11.1	78	June 22
132	14.0	83	June 27	94	9.2	76	June 22
132	14.1	88	July 1	88	12.1	79	July 8
132	11.6	----------	----------	87	----------	75	June 30

Average number of coeca, 134.1; average length of three longest coeca 10.9 cm.

It is of much interest once more to attempt to analyze the Fort Bragg salmon with reference to the particular river systems to which they may belong. Such a diagnosis is facilitated by referring again to figure 33. Here we see the ocean series of pyloric coeca counts plotted with reference both to the Klamath and the Sacramento coeca series. Considering as before the typical Klamath and Sacramento individuals to be separable by an ordinate erected between the 153 and 154 coeca values, it is of significance to note where this vertical cuts the Fort Bragg series. The great mass of the Fort Bragg collection is seen to fall below this ordinate. In fact, 80.4 per cent (41 cases) of the coeca counts from Fort Bragg coincide perfectly with the frequency distribution of the Klamath coeca counts (based on the validity of our selected dividing ordinate).

Naturally one must guard against formulating generalities supported by the study of series no larger than our present one from Fort Bragg. As briefly mentioned above, however, these studies covered the interval between June 20 and August 12, a very considerable portion of the commercial fishing season at that locality. The longest hiatus without data was 13 days (July 20 to August 2); the average interval between collections was 2.8 days. It would seem, therefore, that our 51 pyloric coeca counts from king salmon at Fort Bragg might form a reasonably fair basis upon which to compute a purely tentative analysis of the composition of the catch at that point. We may be justified in stating that our data of 1922 rather strongly indicate that the king salmon caught at sea off Fort Bragg during the period of our investigations were chiefly of the Klamath River type.

By referring to Table VI the following facts are to be noted for the Fort Bragg series (provided the two river races are recognizable in our data). First, the Sacramento fish were restricted to the period prior to and including July 20. Second, all August fish had coeca counts between 121 and 140. Lastly, Klamath River salmon were taken throughout the period from June 20 to August 12 (the entire period of observation).

TABLE VII. PYLORIC COECA DATA FROM MONTEREY KING SALMON.

Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date	Number of coeca	Average length of 3 longest coeca, cm.	Length of fish, cm.	Date
			1920	171	2.94	59	June 11
226	2.19	47	June 11	167	2.87	55	June 11
215	3.31	72	June 24	165	4.62	88	June 22
196	2.37	58	June 24	165	4.81	90	June 24
194	3.50	86	June 11	162	3.19	59	June 11
192	3.50	68	June 24	162	2.50	54	June 24
192	4.25	86	June 22	159	3.43	86	June 22
191	3.43	64	June 24	155	4.62	85	June 24
187	2.31	53	June 24	146	6.87	109	June 11
181	4.12	83	June 24	141	5.87	97	June 22
181	4.00	76	June 24	123	5.50	88	June 22
177	2.37	51	June 11				

Mean, 174.9.

The coeca of 22 king salmon caught in Monterey Bay have been counted. This very limited series was collected at intervals during the period between June 11 and June 24, inclusive. The counts (see

Table VII) varied from 123 to 226, with a mean value of 174.9 coeca—almost identical with the mean value of the pyloric coeca series of the Sacramento River fish. These are also plotted in figure 33 (as were the Fort Bragg coeca counts) in direct relation with the Klamath and Sacramento series. It will be seen that our ordinate, selected to best separate the Klamath and Sacramento fish, cuts the Monterey series in such a way as to throw 19 individuals into the Sacramento group and only three individuals into the Klamath series. Reducing these quotas to terms of percentage, the above diagnosis suggests a Sacramento River representation of 86 per cent and a Klamath River quota of 14 per cent of the Monterey series. This collection is far too small to justify serious conclusions and we have included the data merely for what it may be worth.

Gill Raker Counts.

Our third anatomical character which we have utilized in the separation of the Klamath and Sacramento races of king salmon consists of the number of gill rakers on the first branchial arch. As in the case of the ova and coeca counts, so with the gill rakers, we have three series: One each from the Sacramento and the Klamath systems and one from ocean-trolled fish off Fort Bragg.

The data concerning Sacramento salmon were secured from Martinez (on Suisun Bay) and from hatchery fish. The series consists of 35 cases and the counts are as follows: 21 gill rakers, 1 case; 22 gill rakers, 7 cases; 23 gill rakers, 10 cases; 24 gill rakers, 9 cases; 25 gill rakers, 8 cases. Thus we have a range from 21 to 25 gill rakers with a mean value of 23.5 gill rakers.

The data respecting Klamath River salmon were secured from three sources: The estuary at the mouth of the river; the Klamathon racks, far up the river, and at the hatcheries. In all, 51 gill arches were examined with the following results: 24 gill rakers, 2 cases; 25 gill rakers, 3 cases; 26 gill rakers, 10 cases; 27 gill rakers, 10 cases; 28 gill rakers, 14 cases; 29 gill rakers, 9 cases; 30 gill rakers, 3 cases. This yields a range of 24 to 30 gill rakers and a mean value of 27.4 gill rakers.

Our gill raker data in the case of the Fort Bragg king salmon were secured from a series of 51 individuals as follows: 22 gill rakers, 3 cases; 23 gill rakers, 2 cases; 24 gill rakers, 2 cases; 25 gill rakers, 8 cases; 26 gill rakers, 10 cases; 27 gill rakers, 16 cases; 28 gill rakers, 7 cases; 29 gill rakers, 1 case; 30 gill rakers, 1 case; 31 gill rakers, 1 case. Here we have a range in gill raker values from 22 to 31 with a mean value of 26.2.

TABLE VIII. GILL RAKER COUNTS FOR SACRAMENTO, KLAMATH AND FORT BRAGG KING SALMON.

Gill rakers	21	22	23	24	25	26	27	28	29	30	31	Mean
Sacramento River fish	1	7	10	9	8	----	----	----	----	----	----	23.5
Klamath River fish	----	----	----	2	3	10	10	14	9	3	----	27.4
Fort Bragg fish	----	3	2	2	8	10	16	7	1	1	1	26.2

Again it is of much interest to see what can be done in the way of isolating either Sacramento River or Klamath River salmon from the ocean catch at Fort Bragg, using the gill raker counts. By referring to

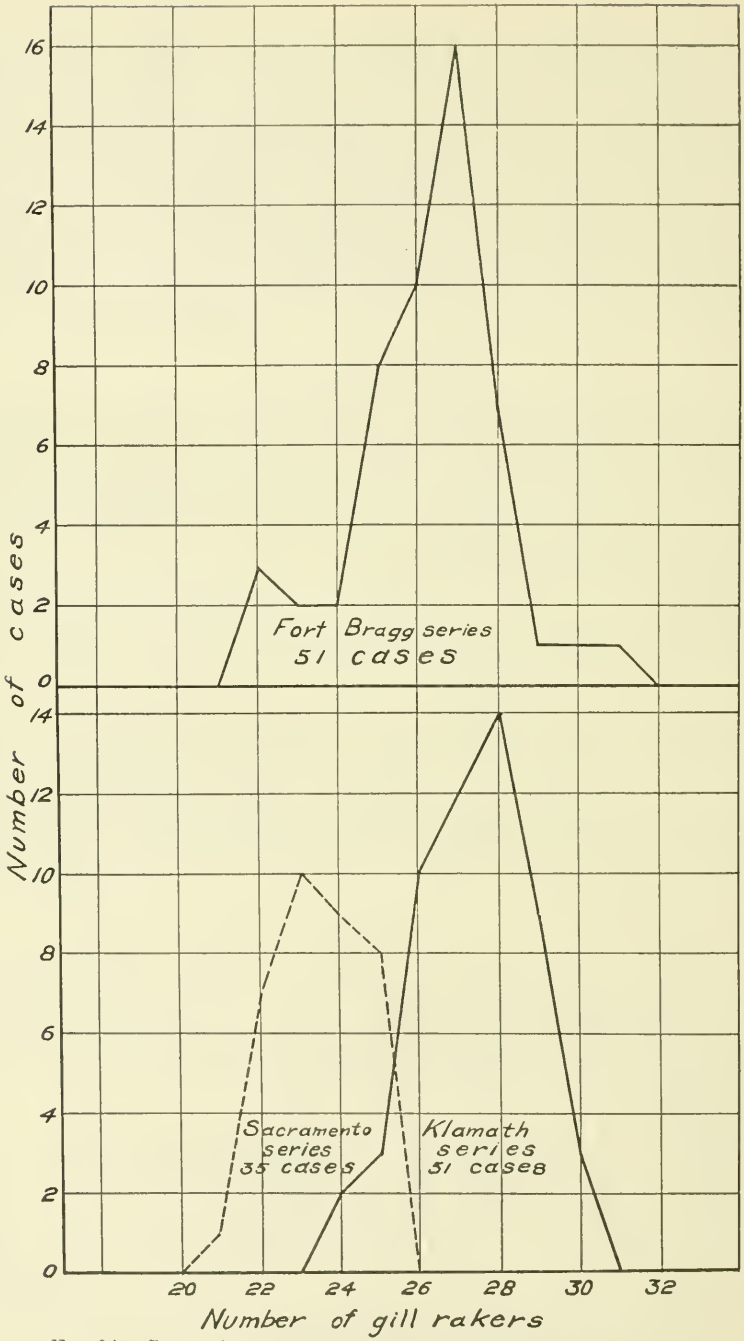

FIG. 34. Comparison of the number of gill rakers in Fort Bragg, Sacramento and Klamath series of salmon.

figure 34 wherein the various gill raker counts have been graphically presented, we are able to fix upon a vertical between the 24 and 25 ordinates as the most logical cleavage line between the gill raker values for the Sacramento and the Klamath River race. It is rather unusual that, whereas in the Sacramento series eight individuals had 25 gill rakers, none had 26. Probably a larger series would contain a few individuals with 26 gill rakers, resulting in a slightly increased overlapping of the "curves." Assuming, then, that five of the Fort Bragg individuals with gill raker counts of 25 are referable to the Sacramento race, we may, on the basis of our assumed dividing ordinate, analyze our Fort Bragg series as follows:

	Number of cases	Per cent
Klamath race	39	76.5
Sacramento race	12	23.5
Totals	51	100

This agrees nicely with the similar analysis of the Fort Bragg series based on the pyloric coeca counts.

In the case of the particular individuals in the Fort Bragg series having coeca counts above our dividing ordinate and suggesting that they may belong with the Sacramento race, we have subjected them to a similar test with reference to the arbitrary gill raker ordinate. Of these nine individuals five are seen to have more than 25 gill rakers, which places them with the Klamath race; the other four fall with the Sacramento series.

Again, we have compared these same individuals with reference to coeca and ova counts and find that every individual whose coeca count indicated it to be of the Sacramento race had ova counts above 5000, thus agreeing in this respect also with the Sacramento characteristics. These comparisons we tabulate below:

Collection number	Coeca	Gill rakers	Ova
1995	185 (S)	28	5450 (S)
2119	185 (S)	27	5093 (S)
1908	182 (S)	22 (S)	6851 (S)
1912	180 (S)	27	6358 (S)
1994	180 (S)	26	6309 (S)
2116	174 (S)	25 (S)	----------
1838	161 (S)	25 (S)	9021 (S)
1992	160 (S)	26	5042 (S)
2023	155 (S)	24 (S)	8258 (S)

With regard, then, to our nine doubtful individuals, four of them (concurring nicely in ova, coeca and gill raker characters) may be placed with much confidence with the Sacramento race. This leaves a residue of only five individuals which appear not to belong with the latter race. These fish seemingly belong to a race which possesses the coeca and ova characteristics of the Sacramento salmon but have the gill raker traits of the Klamath fish.

Therefore, on the basis of this comparative analysis of the few doubtful coeca counts from Fort Bragg, we compute that approximately 82 per cent of the entire Fort Bragg series are of the Klamath race, 8 per cent are of the Sacramento race, while 10 per cent are of a doubtful source.

Vertebra Counts.

The writer has recently conducted some experiments with the use of X-rays for the vertebral examination of fishes. A report of this work, now in manuscript form, will give the details of the technique and we will merely state here that in connection with our X-ray operations we made some radiographs of Klamath River and Sacramento River king salmon. The results of these are listed below.

TABLE IX. VERTEBRA COUNTS OF KING SALMON "FRY" SECURED BY RADIOGRAPHS.

Klamath Estuary Sept. 20 1921	Fall Creek Hatchery (Klamath ova) Sept., 1922	Fall Creek Hatchery (Sacramento ova) Nov., 1919
No. 1=62+6=68 vertebrae	No. 1=61+6=67 vertebrae	No. 1=58+6=64 vertebrae
No. 2=61+6=67 vertebrae	No. 2=60+6=66 vertebrae	No. 2=56+6=62 vertebrae
No. 3=62+6=68 vertebrae	No. 3=61+6=67 vertebrae	No. 3=59+6=65 vertebrae
No. 4=62+6=68 vertebrae	No. 4=60+6=66 vertebrae	No. 4=59+6=65 vertebrae
No. 5=60+6=66 vertebrae	No. 5=60+6=66 vertebrae	No. 5=56+6=62 vertebrae
No. 6=62+6=68 vertebrae	----------	No. 6=59+6=65 vertebrae
Mean, 67.5 vertebrae	Mean, 66.4 vertebrae	Mean, 63.8 vertebrae

The formula here used to express the vertebral count is applied as follows: The second value denotes the number of vertebrae involved in the caudal support; the first value denotes the number of vertebrae preceding those just described; the last value represents the total number of vertebrae (not counting the urostyle).

It will be seen that the number of vertebrae of the Klamath River race exhibits a range of from 66 to 68, with a weighted mean of 67.0. Those of the Sacramento race show a range of from 62 to 65 vertebrae with a mean of 63.8. In this case there is no overlapping of the two series, but this phenomenon might occur to some extent were we to examine a larger number of individuals.

Table X presents in condensed summary form the results of the present investigation.

TABLE X. ANATOMICAL FEATURES OF KING SALMON OF THE KLAMATH AND SACRAMENTO RACES AND OF FORT BRAGG OCEAN-CAUGHT CHINOOK.

	Klamath series		Sacramento series		Fort Bragg series	
	Range	Mean	Range	Mean	Range	Mean
Ova counts	1,718 to 4,977	3,760	4,795 to 11,012	7,453	3,147 to 9,021	4,910
Coeca counts	93 to 193	132.2	134 to 214	176.4	87 to 185	134.1
Gill raker counts	24 to 30	27.4	21 to 25	23.5	22 to 31	26.2
Vertebrae counts	66 to 68	67.0	62 to 65	63.8	----------	---------

The foregoing presentation of the results of our studies of the ova, pyloric coeca, gill rakers, and vertebrae would appear to support the belief that the Klamath and Sacramento races of king salmon possess anatomical differences of sufficient magnitude to enable careful workers to recognize individuals of the two races. Obviously, however, before one would be in a position to eliminate with reasonable certainty all individuals of other neighboring streams, studies similar to the present investigation would need be applied to the remaining forms. As already suggested, though, it seems reasonable to suppose that the chief salmon fisheries of the California littoral are supported in large measure by the fish of the Klamath and Sacramento rivers. If this be true, our data should constitute a preliminary guide for the resolution of our ocean run fish into their two great component groups.

A SHEEP-KILLING BEAR.

By L. N. Lorenzen, Grazing Examiner.

Since the bear has been made defendant in many sheep-killing cases in northern California and several reliable mountaineers have come forth to his defense, I am going to state my side of the case and the reader may draw his own conclusion as to the innocence or guilt of the bear.

In 1918 I had an occasion to visit a sheep camp near the slides of Nelson Creek and, upon my arrival at this camp in the evening, the herder informed me that an old bear with two cubs had been following the sheep for about ten days and was killing a sheep every other evening. That evening while watching the sheep feeding into the bed ground, I happened to look up on a side hill where there were about fifty head of sheep and I saw a dark brown object charge the rear of this small band. I immediately informed the herder that his pet bear had taken another sheep, whereupon we collected all the sheep dogs and a prize hound that was kept at the camp to defend the sheep from bear, and went to the scene of the kill. Here we found fresh bear tracks and fresh blood on the ground and on the brush. We turned the dogs loose, giving the hound first place, and I expected that we would soon have the bear up a tree and completely at our mercy; but not so. The hound led out with a loud bellow and long leaps, with the other dogs in hot pursuit. Soon we heard the dogs in a free for all fight among themselves, about 150 yards up the hill, and when we got there we found that they had chased the bear away from the carcass of the sheep and had it about devoured. Here our chase ended until we could get the few remaining morsels of the sheep away from the dogs and hang them in a tree out of their reach.

After the hound had satisfied himself that there was no chance for any more mutton for supper he reluctantly took up the bear track and we could hear him bellowing on the trail for about an hour. By this time it had become so dark that further chase was impossible. The only real good with which I was able to accredit the hound, aside from eating up everything around camp, was to chase the bear far enough away that it took her two days to walk to the band of sheep, which fully explains why she killed a sheep only every other day. This is a case where I was an eye witness to the killing, and I am able to cite other instances where sheep were compelled to leave the ranges on account of bear.

I do not believe that every bear kills sheep; in fact, I feel sure that they do not, but I do think that any of them can acquire the habit with a very small amount of encouragement. Careful observation has led me to believe that in many instances the bear acquires the habit of sheep killing from the careless method of disposing of sheep which die on the ranges. These sheep and others which are sick or crippled are left behind the band for any animals that wish to prey upon them. The bear, being a scavenger, eats the dead sheep and if he finds one that is not quite dead he may kill it and thus acquire his desire to kill to satisfy his ungovernable appetite for mutton.

Whenever a bear has acquired the habit of sheep killing there is but one thing for the sheep man to do if he wishes to continue using the

range, and that is to dispose of the bear. As a general rule it is not hard to distinguish a bear's kill in a band of sheep from that of coyotes or lions. The bear is a glutton and will seldom kill more than he can eat, which, as a rule, is but one sheep, while a lion or coyote will often kill as many as ten before stopping. I do not believe in taking protection away from bear but I think if the sheep men will bury all dead sheep (not burn them, because this is prohibited on account of fire danger), that the losses due to bear will be considerably less.

A SALMON'S LAMENT AT THE ESTACADA FISHWAY*

By E. A. McGregor.

Oh tell me, brother *Homo,*
What you think I'd better do;
Here I am from deep salt water
With a dress of silvery blue.

I have struggled up Columbia's
Dang'rous waters set with seines,
Dodged 'twixt salmon wheels and gill nets—
Overtaxed my meager brains.

When I reached the broad Willamette
Something told me to turn in,
And I swam past Portland City—
Urban sewage on my skin.

Icy waters of the Clack'mas,
Fed by sparkling mossy springs,
Aroused my latent instincts,
Formed by ancient salmon kings.

Up the stream to Estacada,
O'er many a baffling falls,
I was urged forever onward,
Onward up the cascade walls.

Ever dodging wary anglers
And evading cruel spears,
I arrive at Estacada—
Rather tatterd for my years.

Up the stream to Estacada
With my load of salmon eggs;
I would that I might shed my fins
And grow a pair of legs!

Some greedy corporation
Has built a mighty dam—
Eighty feet above the river—
For mercenary *Man.*

True enough, they built a "fishway"
On the placid eastern side,
Fraught with crooks and bends and zig-zags—
But they've not supplied a guide!

So here, at Estacada,
With my fifty-hundred eggs,
Alas, has Nature failed me
In my desp'rate need of legs.

A slave to instinct habit,
I must batter at the falls,
Which splash o'er rocky ledges
'Neath the massive concrete walls.

For Nature's built within me
A law both wise and rash:
You who'd gain the crest,
Leap where the waters splash.

Oh men of greed and money,
You've reared a lofty dam;
Your whirling turbines capture
All the kilowatts they can.

I would that you might ponder
On the ages that have passed;
Of our countless generations
I fear I'm near the last.

Long e'er you men of fortune
Had your "easy-money" dreams;
In fact, before the white man
Ever saw our western streams:

In those virgin days primeval
My silvery chinook tribe
Fairly dammed the river's current
As we swarmed from ocean tide.

My breed is doomed to perish,
Your dams obstruct my way,
Our spawning runs are baffled,
My eggs I'll never lay.

Shame, greedy men of Mammon,
Though your golden turbines turn,
You have stilled my silv'ry fam'ly
By your projects bold and stern.

Yes, I'm here at Estacada
With my fifty-hundred eggs,
After dodging seines and gill nets–
But I lack a pair of legs.

And an Alpine guide should lead me
Up your stupid mystic route,
Which is far too steep and dizzy
For a salmon or a trout.

*The above poem may not pass the censorship of students of English and of poetry, but the idea behind it is unmistakable. It was contributed by a scientific investigator who, fortunately, is one who has some æsthetic ideals that have not been obliterated by diligent search for fact.—Editor.

CALIFORNIA FISH AND GAME.

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January 12, 1924.

Through education, law enforcement and organization, the destructive ideas of taking without returning, of destroying without restoring, of using up in the present without regard for the future, are rapidly giving place to better and more unselfish views.—A. B. Brooks.

STATE FAIR EXHIBIT.

The permanent exhibit at the State Fair was remodeled and put in shape during August and proved, as usual, a great attraction during fair week. In addition to the panorama with its changing lights, the usual exhibit of live trout was made. A splendid shipment of golden trout from the Mount Whitney region proved a short-lived attraction for continued difficulty was experienced with mineralized water. The well water used in the aquaria has usually been sufficiently pure to sustain fish life but this year many valuable fish were lost. Record should here be made of the death of a very unusual eastern brook trout with a notable color pattern. This fish, nearly 20 inches in length, was marbled over its entire surface with a pattern exactly like that on the back of an eastern brook trout. In other words the color pattern of the back extended down over the sides, displacing the usual spotting.

An interesting display of illegal nets and set-lines occupied space in the second room. On one wall hung a sturgeon set-line, the kind of line largely responsible for the depletion of this valuable food fish. Overhead hung a fyke net and on the north wall was to be seen a small silken net used by the alien violator in capturing small song-birds. The usual arrangement of enlarged photographs decorated the walls. As in the past, the educational films of the Commission were displayed twice daily in the motion picture theater. A lecturer explained the pictures and emphasized fish and game conservation.

PUBLIC SHOOTING GROUNDS—GAME REFUGE BILL.

A concerted effort is being made to gain the passage of the proposed Public Shooting Grounds—Game Refuge Bill, killed by the last Congress. With the objections of the western commissioners removed, the bill should have every chance of passage. Its greatest antagonist is no longer in Congress and additional friends are lining up for the passage of the measure. The California Fish and Game Commission has taken a definite stand in favor of the bill.

IN MEMORIAM—JOHN J. BARNETT.

As if the inexcusable number of hunting "accidents" already were not appalling enough, it remained for an unkind fate to add Deputy Fish and Game Commissioner John J. Barnett to the list early on Labor Day, when this big-hearted, faithful and fearless conservation officer was instantly killed while trailing a mule-deer near Lookout in Modoc County, where he had gone with a party of Ventura friends for his first "regular vacation" in years.

The fatal shot was fired by a close friend and county-appointee who claimed to have drawn trigger on a large deer which apparently the bullet did not strike, but found its billet in Barnett's back about 75 yards farther on. The course of the wounds indicated he had been following a fresh track and crouching to see it better in passing through the brush. As it was a soft-nosed Mauser, no deer-hunter doubts that the poor fellow was past recognizing even the nearly-crazed unfortunate who rushed up in response to his agonized cry. Such a coincidence of shooter, deer and victim in line 150 yards apart surely suggests the faith of the "Fatalists" who believe their time fixed.

"Big Jack" was buried by the Benevolent and Protective Order of Elks, in presence of his nearest associates of the Southern Division of the Fish and Game Commission, together with a host of other near and dear friends whose presence at the last tribute of respect and affection spoke more eloquently than mere words of the

high regard wherein the dead officer was held by his fellow-townsmen and co-workers. His death was a personal loss to thousands of sportsmen with whom he dealt in course of conservation duty.

Pitiful and wholly regretable as must be any accident which snuffs out in his very physical prime, a magnificent specimen of muscular, upstanding manhood, six feet one-inch tall, broad shouldered, weighing 225 pounds, in condition, whose very appearance helped uphold the majesty of the law, the death of this veteran fish and game protector at least demonstrated that an honest and active warden as criminally careless starting of fires is doing. Yet, for those mentally capable of careful thought, this incident of a veteran, experienced deer hunter dying before the fire of another by no means a novice, is fraught with food for earnest consideration. It is certain that the enormous increase of hunting "accidents" is becoming one of the greatest deterrents to those who otherwise would seek out deer.

Of the work of "Big Jack" Barnett, as he was affectionately known, volumes might be written concerning the wild-life welfare of Ventura County; he was born there, and knew his hills as few if any

John J. Barnett.

nowadays stands better than well in his community; and that the days when conservation enforcement lacked support are now numbered in the "Dark Ages" of southern California. Would that we also might believe that this terrible and shocking accident which has torn from wild-life work one of its most experienced protectors, might help somewhat to impress upon everybody the need of more and more caution afield in this time of ever-increasing hunting enthusiasm; for such belief might hold the hope that this good and true sportsman had not died wholly in vain. But it is hardly even a hope; for calm judgment fears that the killing of men for game will go on and on, even

others now know them. In his youth a professional ballplayer of National League ability, he was an enthusiastic and true sportsman to the last, falling a victim to his disinclination to kill any but the largest, finest deer, for which he had made this last trip to northeastern California's lava beds, seeking out the biggest and best of the "muley" bucks. He protected the game in best of faith because he had the sportsman's abiding love of it; a love that has accomplished all the practical results in its behalf that this state ever has attained. In passing, it might be said that there were few hunters and shots his equal with either rifle or shotgun. To a perfect physique he added a

true eye and an enormous, lifelong experience with the habits of wild game as well as the human nature of its biped enemies. Such men are rare, and becoming rarer in these days of advancing civilization; their loss is one impossible to replace. They know the game and its controlling conditions; would we had more of them.

Barnett's is a loss that can not even be written of by those who knew him, without tears. Particularly does it come home to those of us who can not bring ourselves to believe that this big, handsome fellow with his cheery smile will never again darken the office door, to brighten up the place a minute after with that breezy way so intimate a reminder of the great outdoors he loved so well and served so faithfully.

L. HEDDERLY.

ALBACORE FISHERY WORRIES CANNERYMEN.

Cannerymen of southern California were greatly disturbed during the latter part of July because of the failure of albacore to put in an appearance in their usual habitat about the Channel Islands. Five hundred fishing boats scoured the sea but failed to find fish. As a consequence the price jumped from $120, that paid last year, to $220 and even $300 per ton. Even with such prices offered, the canneries, as well as the fishermens' fleet, remained idle.

On August 1, large catches were reported in the vicinity of Todas Santos Island, off the Lower California coast. Albacore were reported as close in shore and very hungry. Although some improvement was evident later, yet the season proved a very poor one.

On August 27, near the end of the season, the Curtis Corporation of Long Beach paid fishermen $400 per ton, the highest price which has ever been paid for "white meat" albacore. Moreover, this has been the shortest season in the history of the industry. The pack this year it is estimated will amount to about 185,000 cases as compared with last year's total of 300,000 cases. Undoubtedly this scarcity will result in an increased market price for the canned product.

This decreased run of tuna adds one more problem in the investigation being made by the Fish and Game Commission to determine whether such a scarcity of fish is caused by actual depletion or by natural fluctuation.

COURT ORDERS SCREENS INSTALLED.

Because of its possible bearing on the application of the Electro-Metals Company, now pending before the Department of Public Works, Division of Water Rights, for certain water and power rights on the Klamath River, unusual interest attaches to the permanent restraining order issued by Judge C. J. Luttrell of the Superior Court of Siskiyou County, July 17th. This order, which directed the Parker Company, owners of large holdings of irrigated lands in Scott Valley, to refrain from using their canals and ditches until properly and adequately supplied with screens, upholds the right of the state to compel owners of land to install screens which will prevent the fish from being carried out onto the land. The decision is encouraging as such screening would be useless should the proposed dam be built near Orleans.

This proposed project of the Electro-Metals Company is one which challenges the interest of all California anglers since their object is the construction of a dam 250 feet high, 80 miles from the mouth of the Klamath River, the last stronghold of the king salmon, the best run of trout, and the most important source of supply of trout eggs. The attempt to preserve these great natural resources is not in any sense a move to hinder power development in California. It is stated on good authority that not only is there no immediate need for further power development on the Klamath River, but that it will be many years before such need exists.

SAVE THE KLAMATH SALMON AND TROUT.

Typical of the letters being received by the commission regarding the proposed construction by the Electro-Metals Company of a 250-foot dam 80 miles above the mouth of the Klamath River, which would form an impassable barrier to the last great run of king salmon and sea-run trout in the state, is the following from a California sportsman:

"I never enjoyed fishing any place more than on the Klamath River. The fish are too hard for the 'greenhorn' to catch. They are large and fine and good fighters, and the Klamath is a swift-running river. If the Electro-Metals Company is allowed to put in a dam at "Happy Camp" on the Klamath, the river will surely be ruined for all kinds of fishing. The run of salmon and steelhead will be shut out and the stream rendered useless for propagating these

fish. This it would be a shame to allow, for California is a paradise for sportsmen and the fish and game should be preserved. The run of salmon and steelhead in the Klamath River is a great asset to California. The loss of it could never be recovered, or even repaired. Therefore, in this particular instance I believe the state can not afford to allow the construction of this dam. I am glad to know the Fish and Game Commission is trying to defeat this proposal and I certainly hope it may be prevented."—R. F. COOKE, Los Angeles, Cal.

THE ALIEN VIOLATOR AND EDUCATION.

In California the majority of violations of the game laws are credited to aliens, of whom a large proportion are Italians. It is a notable fact that they are particularly troublesome about taking all kinds of birds, the song and insectivorous species as well as the game birds and small animals taken out of season. Many nets and other illegal devices for snaring small birds have been confiscated by deputies.

These violations are better understood when it is known that Italian game laws differ radically from those of this country. It is small wonder that the Italian laborer looks upon his hunting permit as a blanket affair covering everything, when in his own country all birds, even to the smallest varieties and those of most value to agriculture, either had a long open season or no protection whatever. It is also true that most of the devices used for catching birds are permitted in Italy, even to the use of decoys in nets during daylight hours.

In view of these facts the most logical and fair remedy, it would seem, lies in a campaign of education designed to inform such violators of the differences in our game laws and to impress them with the fact that our laws will be enforced. Teach them the value of birds to agriculture, provide signs and notices printed in their own language explaining specifically what a hunting license covers and when seasons open and close. Such a campaign, thoroughly and persistently followed, may result in turning many of this class of violators into active conservationists. The cause of good citizenship will thereby be advanced also. The Commission plans to enlist Americanization agencies in such a campaign.

CONSERVATION SENTIMENT IS GROWING.

Heretofore drainage projects have been put through with no consideration being given as to the effect upon natural resources. If land could be drained and turned into farm land, it was considered sufficient cause for destroying breeding grounds of fish or game. That the time has come when the value of such areas as breeding grounds for wild life is actually considered and compared with its agricultural value is evident from recent legislation in the middle west and from the storm of protest which has arisen over the proposed Winneshiek Bottoms Drainage Project. The area proposed to be drained lies along the Mississippi River between Lake Pepin, Minnesota, and Rock Island, Illinois. The plan is to dredge and dyke the main channel of the river so that all the rest of the bottom land from bluff to bluff will be thereby made dry land and thus suitable for farming purposes.

An agricultural expert of the Iowa Experiment Station opposes the project on the grounds that it is economically unjustifiable on acount of the prohibitive cost, the small value of the farm land, the danger of overflows and the resultant destruction of the breeding places of waterfowl and fur-bearing animals, and the spawning grounds of fish, as well as the recreational features of this section.

The Isaak Walton League points out that this area is the spawning grounds for black bass and all of the warm water game and food fishes. It is called the greatest natural hatchery for game fishes in the whole world.

An investigator sent out by the United States Biological Survey reports that the whole area is an excellent resort for waterfowl of all kinds and that the muskrats are a resource of considerable value. The various lakes and sloughs form a wonderful refuge for fish and supply suitable spawning grounds. During the year 1921, the United States Bureau of Fisheries reclaimed 23,607,000 fishes from this general area. The Bureau of Fisheries which has endeavored to maintain the supply of fish in this part of the Mississippi River recognizes that all of their work would be nullified by this drainage project. Local sentiment also appears to be strongly opposed.

Secretary Hoover, when interviewed on the subject, is quoted as saying, "Until the people care and let their state governments and the national government know that they do care, it is useless to attempt to get anywhere with pollution or any outdoor American legislation."

It is certainly encouraging to see such strong opposition to a scheme which undoubtedly would seriously affect the fish and game resources of several states.

CALIFORNIA ASKED TO INTRODUCE THE AMERICAN WOODCOCK.

The Bulletin of the American Game Protective Association, through the columns of *Field and Stream*, makes the suggestion to the various game commissions of the Pacific coast that they introduce the American woodcock from eastern states, where it is still possible to secure a supply. Conditions on this coast, from British Columbia to northern California, are said to be ideal for this highly prized game bird.

Many experiments in introduction of exotic species have been tried, as for instance, that of the California quail into Chile, the importation of the Hungarian partridge into many western localities in Canada and the United States, and the popular Chinese pheasant into several states. Where such introductions do not interfere with native species, they often

FIG. 35. "I got him!" That was the exclamation heard from Mrs. John Edwin Hogg after a lone Canada "honker" winged his way over the marsh and she had fired one shot at him with a 20-gage shotgun. Photograph by John Edwin Hogg.

prove a valuable contribution to the game resources, furnishing additional sport and, in some cases, being of possible help to native species by lessening the concentration of hunting upon them.

Where, however, has a migratory shore bird been successfully introduced? This would constitute a brand new experiment and one fraught with unknown difficulties. Then too, it is well to remember in this connection that all such introductions have greatly increased the problem of game conservation and in some cases species have proved dangerous pests. In such an undertaking, western states should proceed with caution and thoroughly investigate the problem before launching such a project.

OREGON HAS NEW COMMISSION.

During June, Governor Pierce of Oregon made a complete change in the Game Commission. The Governor's statement was as follows:

"I am making a change in the game commission of Oregon because of the lack of harmony now apparent in that body and because of the strong indication of political manipulation by certain men now connected with the administration of game affairs. The future of game in the state of Oregon is far too important a matter to be handed about politically.

Three hundred thousand dollars annually as paid by the sportsmen of the state is far too large a sum to be jeopardized by disconcerted effort. The preservation of wild life of the state is the paramount consideration of the commission.

Because of these considerations I deem is advisable at this time to make changes in the personnel. The governor is responsible for the commission and therefore to the sportsmen of Oregon for the conduct of game affairs.

With the deep realization of that responsibility I have selected as new members of the commission, men of the highest type, all of them successful and responsible business men and all interested in the conduct of game affairs.

It is not the intention of the executive to dictate to the new commission or to meddle in any way with its affairs. It is not the purpose of this office, as has been suggested, to throw the commission into politics.

Game affairs are to be left entirely to the new commission, a body in which the governor has the utmost of confidence and a body which will meet its obligations with the greatest advantage to the wild life of the state."

THE CROW AND GAME.

Recent investigations by Dr. B. H. Warren along the eastern shore of Virginia has brought forth a mass of evidence showing that great damage to game results from the egg-destroying propensities of the crow. A number of islands were visited and in each instance thousands of eggs of the game and useful birds were found destroyed by crows as well as a large number of young birds. On islands where human habitations were abundant many eggs of chickens and wild ducks were found destroyed.

Dr. Warren states that on Cedar Island, where a colony of about forty crows were found, five nests were discovered. "In an hour and twenty minutes, under these five nests and within a radius of 150 yards, I found fully 2500 egg shells of the game and nongame birds which had been eaten by crows."

"At Pammer's Point there stands a large pine tree, much higher than any other tree about it. This is evidently a feeding station for crows. There were two crows' nests within a hundred or a hundred and fifty yards of this tree. One of these nests contained five young, which were of the common American crow species, and the other containing one young, was that of the fish crow. Under the large tree referred to, near the nests, there were at least 225 empty egg shells; many egg shell fragments about the tree were not counted. This mass of egg shells consisted chiefly of those of clapper rails, green herons, laughing gulls, and a few eggs of barnyard fowls."

The islands visited are very largely owned and controlled by sportsmen's clubs and consequently the investigation should stir up interest in the control of this pest. Fortunately, in California the crow has not developed such unusual egg-eating habits, although it is well known that poultrymen in the vicinity of Petaluma sometimes are troubled by crows. Such evidence as presented by this investigation in Virginia should make California alert to examine the nests of California crows for similar evidence that we may be forewarned as to the actual effect upon other birds.

JAIL SENTENCE FOR VIOLATOR.

An item in the *Catalina Islander* of June 27, states that having been found technically guilty of violating section 636 of the Penal Code (relating to nets), Captain Nick Skomereza, owner of the commercial fishing launch, *Daylight of Seattle*, San Pedro, was sentenced to 100 days in the county jail. Captain Skomereza, who was given a suspended sentence by the court a year ago, admits that the entire catch of fish—18 tons of barracuda—said to have been illegally taken near Seal Rocks, May 7, was sold

and the proceeds received by him and divided among the crew. Although it seems that the vessel left San Pedro harbor without reporting a change of officers, Captain Skomereza maintains that he was not on board the vessel when the fish were taken, and on that ground his counsel announced that the case would be appealed to the superior court. The arresting officers were unable to locate any of the fishermen who manned the boat at the time the fish were taken. Captain Nidever of the Fish and Game Commission appeared in court against the defendant.

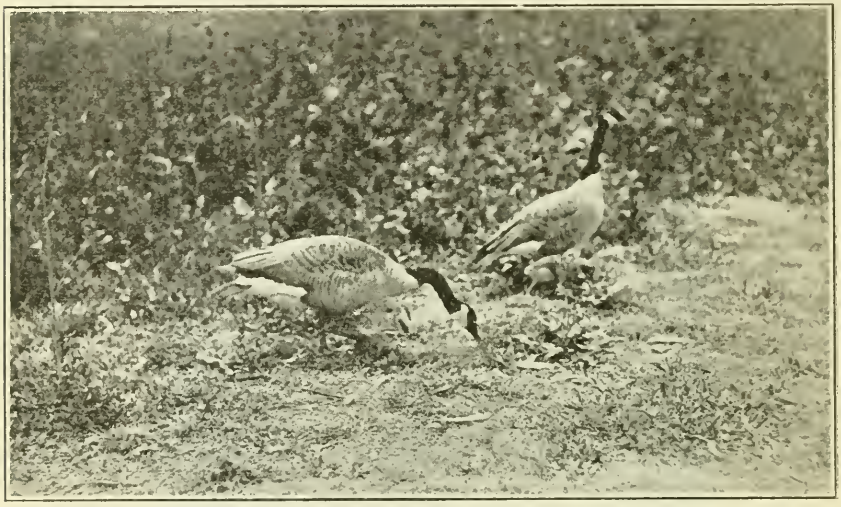


FIG. 36. Canada geese, photographed at former State Game Farm at Hayward. The Canada goose is the largest and the only species of goose which nests in California. Photograph by H. C. Bryant.

GAME LAWS FOR PLANTS.

More and more as the years go by it is becoming necessary to protect, by law, rare or much sought-after native plants and shrubs. Vermont had its problem in the collection of living plants and ferns by nurserymen for commercial sale. Connecticut has the problem of being easy of access by automobile from New York and Boston and of having its woods and hills stripped by motorists of the state flower, the mountain laurel, and of the exquisite trailing arbutus. Because of the destruction wrought upon these and other plants, statutes have been enacted to protect them. Maximum penalties range from $20 to $100 or 12 months of imprisonment, or both. Unless there is a decrease in the heedless gathering of many of our California wild flowers and shrubs, measures will have to be taken for their protection similar to those provided for the Toyon berry.

CONNECTICUT BOARD TO INVESTIGATE SHAD DEPLETION.

For an investigation into the causes of the alarming depletion of shad in the Connecticut River, the legislature of that state has appropriated $10,000. The investigation will be conducted during the summers of 1923 and 1924 under the direction of the Connecticut State Board of Fisheries and Game and a staff of six eminent biologists, including Dr. J. E. Blair of Stanford University, has been engaged for the work.

The shad, a popular fish in eastern markets, has decreased very rapidly since 1919 as evidenced by the decreasing commercial catch and the increasing difficulty of obtaining eggs for artificial propagation. The experiments being undertaken, will cover studies in methods of catching the fish for artificial spawning; life history of the shad including food habits, migration periods, and other phases; various problems of pathology such as parasitism and enemies of larval and young shad; a close observation of ecological conditions, especially the pollution of tributary streams in which the shad spawn; tagging experiments of adults to obtain information on successive migrations and the feasibility of providing greater security to young shad by hold-

ing in specially prepared ponds a part of the artificially hatched fish.

The shad was the first species of fish introduced into California by the Fish and Game Commission (plantings were made in 1871 and 1873) and it became very abundant here. While shad have increased enormously in California, the supply has been greatly depleted along the Atlantic coast. In 1916, Connecticut and Massachusetts sought to obtain shad eggs from the California Commission for their hatcheries in order that they might restock their waters. The California Commission undertook to furnish the desired eggs, expecting to gather them in connection with an investigation of the spawning places of shad and experiments in shad culture. However, the season proved to be such an unfavorable one that it was impossible to gather enough eggs at any one time for shipment east. They did succeed in collecting enough eggs to hatch 872,000 fry which were planted in the Feather River with good results.

WILL ATTEMPT DOMESTICATION OF WILD TURKEY.

Live specimens of the beautiful Honduras spotted turkey, a fine upland game bird, native to a section of Yucatan, Honduras and Gautemala, is the object of an expedition by the Biological Survey of the Department of Agriculture to Central America. According to an editorial note in *Forest and Stream*, June, 1923, the survey intends to undertake experiments in propagating and domesticating these turkeys on an island off the coast of Georgia. The domestication of this species, which is somewhat smaller than our own domesticated turkey, has never been attempted.

THE NATION'S GAME SUPPLY.

Attention is directed to the enormous value of the nation's game supply by the American Game Protective Association. Although monetary values do not compare with the benefits yielded in pleasure, health, personal physical and mental development, self-reliance and skill in the use of firearms, all of which accompany hunting, yet the "dollars and cents" value to hunters is worth consideration. Dr. E. W. Nelson, chief of the United States Bureau of Biological Survey, is quoted from an article in the *Scientific Monthly* as estimating the game of the country, capitalized on a 6 per cent basis, as amounting to $1,000,000,000. Since the licensed and private hunters in the United States are estimated to number about 7,000,000, this would give each sportsman a share in the capital investment of nearly $150. Thus, says Dr. Nelson, "The conservation of wild animals and birds is not a mere fad, indulged in by those who have only a sentimental interest in the subject."

CONSERVING THE FUR SUPPLY.

Resolutions were drawn up at the recent International Fur Convention and Exposition at New York, recommending, for the first time in the history of the fur trade, the formation of a national organization which should hold a yearly convention in that city. The Biological Survey of the United States Department of Agriculture has been greatly interested in the fur industry from the standpoint of the conservation of wild life, and F. G. Ashbrook, one of its representatives, addressed the convention on the work of the Survey relating to fur-bearing animals.

"The fur industry," said Mr. Ashbrook, "employs many thousands of men and women who make their living from furs and who in turn contribute to the comfort of a vast number of people. Ever since the world began people have worn furs and they will probably continue to do so indefinitely. The sources of supply of fur-bearing animals should be assured, however, if the fur trade is to maintain its position among other large industries. We do not need more laws but we need better laws and a stricter enforcement of them.

"The Biological Survey believes that fur farming should be encouraged. At present the majority of fur farmers are raising silver foxes. There are at least 15,000 silver foxes in captivity and the investment in the business exceeds $8,000,000.

"The bureau also believes that to aid conservation, areas which have been depleted of fur bearers should be closed completely for several years, and should be restocked, just as public and private waters are stocked with fish, or game preserves with game.

"Fur laws should be made uniform in all states where similar climatic conditions prevail. Regulation by law of the open season and intelligent trapping should help materially to insure the source and continued supply of fur bearers. Legislation should also require that figures be furnished to show the numbers of the various pelts taken annually in different states."

The fur exposition, which was held in Madison Square Garden, was staged in

an arctic setting composed of igloos, totem poles, snow and icebergs. Living models were posed to show the fur costumes of fourteen different periods in the world's history. Processes in preparing furs and making them up into garments were shown, and a style show was staged. The exposition was open only to those engaged in the fur trade, but there was a strong sentiment on the part of those in charge that another time it should be open to the general public.

WOOD DUCK HUNTING PROHIBITED.

Wood ducks may not be hunted in Minnesota or in any other state at any season, according to the Biological Survey, United States Department of Agriculture, which administers the migratory-bird treaty act. This is a federal law under which the hunting, killing, or possessing of wood ducks is prohibited at all times throughout the United States and by treaty throughout Canada also. This game law, having been upheld by the

FIG. 37. Sting ray, taken by G. A. Clark in Elkhorn Slough, summer, 1920. It weighed 64 pounds and gave birth to seven young soon after capture. Photograph by G. A. Clark.

United States Supreme Court, makes inoperative the amendment to the game laws of Minnesota, passed at the last session of the state legislature, providing an open season on wood ducks. Thus, hunters will not be allowed to exercise the privilege accorded them by the state law, and persons found hunting, killing, or possessing wood ducks at any time, will be subject to prosecution in the federal courts.

HUMAN CARELESSNESS EXACTS HEAVY FOREST FIRE TOLL.

Over 70 per cent of the 610 fires that have occurred up to August 20 this year in the National Forests of California were man-caused, according to the United States Forest Service. These fires burned over 72,000 acres of government land, and 34,000 acres of private property within and adjacent to the federal forests. Out of a total of 124 fires in the Angeles, Santa Barbara and Cleveland national forests of southern California, all but six were due to human carelessness, largely that of smokers, campers and sportsmen. Fires on the Santa Barbara National Forest, set by the carelessness of campers and by incendiaries, have burned over 60,000 acres of chaparral and timber-covered mountain slopes which were of inestimable value for watershed protection purposes. Seventy-four convictions for carelessness with fire in the woods have been secured by the Forest Service to date; the fines ranging from $50 to $500, with jail sentences in some of the more flagrant cases.

Think of what such carelessness means to fish and game!

SIGNS AND SIMPLETONS.

By Ranger Bill, U. S. Forest Service.

"Did you ever notice how many people there are who seem to have a weak cog somewheres in their make-up?" said Ranger Bill as he threw a bunch of new enamel signs that had been shot full of holes into the woodshed. "Mind you I don't claim such folks are what you would call 'foolish,' but they sure must lack good sense to pull some of the tricks they do. Of course sometimes it's due to thoughtlessness, but pure cussedness would be more like it, I reckon, in a good many cases.

"Who'm I alluding to? Why, just them folks, big and small, that go around shooting up signs and writing their names on rocks and trees and buildings and any old handy place. We get a lot of them up here on the National Forests in the summer time—natives and city people and 'dudes' out on a vacation, who either think it's smart to make a pepper box out of a sign or else want to leave a monument to themselves by scribbling all over the landscape. You know that old saying about 'Fools names * * * '?

"You think I'm putting it too strong? Well I don't. If you could trade places with me for a season and see some of the stunts of these vandals, you'd know why I get hot under the Stetson. Let's look at this business with common sense. Here's the Forest Service and the automobile associations of the state spending a lot of good money each year to put up fine enamel signs so that our own folks and all the people who visit California can tour around in the mountains without getting lost. Then along comes some smart Aleck with a gun and—Bang! Bang!—another sign is shot full of holes and ready for the ash heap. And it isn't only one, but thousands of them that get made into a sieve that-a-way. Seems like these fellows would appreciate rather than depreciate a sign, and think a bit about the people that's coming after. Every time a sign is badly defaced a new one has to be made and put up, and that means more money and work. Once in a while we catch these birds, and the way the Judge usually hands it to them sure does a man's heart good. If there is anyone that ought to get it, and get it good, it's these sign poachers.

"Now look at those autograph sharks and some of their artistic work. Why, only last week I found the name of a professor of one of our big state universities scribbled over the newly painted door of a lookout station up at 10,000 feet. What do you suppose his idea was? If he wanted me to know he'd called why didn't he leave a card or write on a piece of paper? If I can tie-in with him I'm sure going to make him back-track up there and scrub that name off with sapolio. Just you stop and take a peek at that big Forest Service sign down at the forks of the road. I only put it up this spring, and now you'll find a regular telephone directory scratched all over its face. No, sir, it ain't th' kids that pull all this stuff, but real grown-up men and women who ought to know enough to respect other people's property.

"A fellow was telling me the other day that the temples in Egypt have all kinds of names and pictures that senseless people scratched on the stones three or four thousand years ago. I always thought we'd kind of advanced in civilization since then, but it 'pears like we've got simpletons in these days same as they had back in King Tut's time."

FACTS OF CURRENT INTEREST.

A 22-inch Loch Leven trout was caught from the Sentinel Bridge in Yosemite Village on June 29th and was on exhibition during that day in the office of the park superintendent. The Loch Leven is one of the introduced fish which, like the brown and eastern brook trout, thrives in the warmer, slower-moving waters of the lower elevations, whereas the native rainbow chooses the rushing mountain streams of a granite-walled canyon.

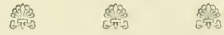
The season of 1923 was the greatest in the history of the Hatchery Department, the largest number of trout being planted in the history of the Commission. The total approximated 31,470,000.

The salmon season has been a poor one, the catch indicating depletion. The take will probably amount to less than half of that for 1919. Reduced catches have been made yearly.

The sardine industry has recuperated and the catch will be close to normal.

Hunting accidents have again been numerous, one of them claiming an efficient deputy of the Commission.

The duck season opened auspiciously on October 1st with birds abundant and many hunters in the field.



The Fish and Game Commission is actively fighting the proposal to build a 250-foot dam near the mouth of the Klamath River. To win the fight means the saving of the last good run of king salmon and of sea-run trout in the state.

Concentrated hunting of mule deer in Modoc County was again reported during the deer season. Sentiment favors increased protection for the large deer of the northeastern section of the state.

HATCHERY NOTES.

W. H. Shebley, Editor.

TROUT EGGS TO BE IMPORTED.

Arrangements are again being made this year to trade the New Jersey Fish and Game Commission 1,000,000 Loch Leven trout eggs for 1,000,000 eastern brook trout eggs. This arrangement, made last year, was instrumental in furnishing our streams with a splendid supply of pure stock eastern brook directly from eastern streams.

screens in keeping fish out of irrigation ditches. The installation, on the Alta Canal near Dinuba, Fresno County, of an improved type of electric screen patented by Mr. H. T. Burkey, has afforded the first opportunity in California to test its real value. The report of Deputy E. W. Smalley, recently submitted, gives the results of observations made by himself and others on the Alta

Fig. 38. Electric fish stop installed in Alta ditch near Dinuba. Investigations showed that this electrical apparatus did not successfully screen the fish from the ditch. Photograph by A. E. Culver.

ATTEMPTS MADE TO SECURE NEW TROUT.

An attempt is being made to secure a supply of Sunapee trout from the Massachusetts Fish and Game Commission. The Sunapee trout is a bright colored trout originally found only in Sunapee Lake, New Hampshire and Flood Pond, near Ellsworth, Maine. Due to fishcultural operations, however, it has been introduced into a number of other lakes. In its native habitat it does not take the fly readily but makes up for this disadvantage by its gaminess when caught by trolling. Fish have keen known to weigh as high as 15 to 20 pounds. It is also said to be especially hardy and easy to propagate.

ELECTRIC FISH STOP DOES NOT STOP FISH.

There has been a great deal of discussion as to the efficacy of electric fish

system below the electric stop at Wahto-ka Lake, covering a period of three months and ranging from the stop at the lake to points south and west of Traver and to points south and east of Orosi.

It appears that early in the season (April 20th to about the middle of June), owing to high waters and the amount of water going through the electric fish stop, it was almost impossible to get definite evidence of fish life. However, observations made on June 21st, which very nearly covered the Alta system, showed several thousand small fish including bass, pike, suckers and river herring in a lateral south of Traver, and numbers ranging from a few to several hundred of these same varieties were found in various checks around Dinuba and Momson. On this date also, a carp about 15 inches in length was seen to go through the stop. About 5 feet below the stop it came to the surface, apparently injured, but less than

100 feet below the stop it was seen to swim away and seemed to have entirely recovered from the shock. By July 8th many small fish were found in a number of the extreme lower laterals of the Alta system south of Traver and Dinuba. The last observation was made on July 18th and up to that time evidence of fish life had been found in nearly every place investigated and hundreds of small dead fish were found at the abutments of the screen and many larger ones ranging from 6 to 16 inches, of the several species mentioned, were found just below the screen. Many of the dead fish found a quarter of a mile down the ditch from the screen, showed injuries from contact with the electrodes. Late in the season, bass ranging from 8 to 12 inches long were seen below the check at the head of the Reedley Canal and one 18 inches long was taken in a seine with a number of smaller ones. Bass were also seen at the head of the Traver Canal and a great many in the branch south of the Dinuba Kingsburg Highway. The accompanying photograph of a bass taken below the fish stop is evidence of the size of fish which can successfully pass this electric stop.

FIG. 39. Large black bass taken below electric fish stop in Alta ditch, along with other specimens, showing that this electric fish stop is not effectively screening the ditch. Photograph by A. E. Culver.

FISH PLANTED BY THE COMMISSION FURNISH SPORT IN NATIONAL PARKS.

Bulletins of the National Park Service report that fishing in the streams of Yosemite and Sequoia national parks has been unusually good this season. The Merced River is said to have furnished better fishing this year than ever before and skilled anglers were successful in taking large fish.

In June the Commission planted 95,000 rainbow trout, received from the Hammond Hatchery, in various streams of Sequoia Park and in July, 90,000 steelhead trout arrived and were planted in Marble Fork, Paradise and Deer creeks. Fifty thousand trout fry were also planted in streams within General Grant National Park. Yosemite's first shipment of eastern brook and rainbow trout numbered 200,000.

TROUT EGGS HATCHED IN GRAVEL.

The new method of hatching trout and salmon eggs in gravel seems to promise advantages of plantings in the headwaters of streams and the tributaries of lakes inaccessible with fry or fingerlings, of making distributions over greater water areas and so of materially reducing hatchery expenses and distribution costs. In the U. S. Bureau of Fisheries document, "Propagation and Distribution of food fishes, 1922," Glenn C. Leach, of the Division of Fisheulture, reports the general results of experiments conducted by various stations of the Bureau in which the eggs were placed in gravel in hatching troughs, in open-air rearing ponds and in creek beds. In cases where the eggs were protected from frost and

where there was a good circulation of water, good hatches were secured in nearly every instance.

Since the gravel beds of gently flowing streams and places where seepage or substream flow is present, are the spawning places naturally sought by trout and salmon, it is not surprising that practically perfect results are secured under such conditions and that the fry so hatched are exceptionally vigorous and fitted to survive.

It can not be expected that this method will prove of great value in hatchery operations in general, especially on a large scale, but its value in stocking suitable waters with eyed eggs may supplant the planting of fry and fingerlings in such places.

FIG. 40. Type of screen being installed by the Los Angeles Aqueduct at Fish Springs, Inyo County. Photograph by A. E. Culver.

A successful planting by this method was made in Yosemite this past summer. A shipment of eggs from the United States Bureau of Fisheries hatchery in Yellowstone National Park was planted in the stream near Ottoway Lake. Later investigation by Ranger Skelton showed a large percentage of eggs hatched. Plenty of egg shells and some newly hatched fry were found.

WHAT PERCENTAGE OF TROUT REACH MATURITY?

An experiment with trout fry and fingerling to determine two much mooted questions among fishculturists is in progress under the direction of Mr. Robert L. Ripple, Superintendent of the State Fish Hatchery at Bayfield, Wisconsin. Reliable data on what percentage of planted trout reach maturity, whether it is better to plant fry or fingerlings, and what is a good average growth in cultivated water is the object in view. The experiments are being conducted in a large pond in which conditions affecting trout approximate those of a stream, and where an absolute check on the trout planted can be obtained. In the fall of 1921 there were planted in this pond 2000 small fingerlings. At the end of a year, the pond was drained and the yearling trout were carefully counted. A total of 1321 trout averaging seven and one-half inches in length had survived. The minimum and maximum lengths were six and nine inches respectively. This season the experiment is to be repeated with the substitution of fry for the fingerlings. The results will be awaited with interest as an aid in solving some hitherto unsolved problems of fisheulture.

FISH DISTRIBUTION, 1923.

Previous to September 28, the Fish and Game Commission had planted in the various streams of the state approximately 9,983,000 rainbow trout fry, 5,300,000 Loch Leven, 8,667,000 steelhead, 3,480,000 eastern brook, 1,325,000 brown, 2,530,000 large lake, 95,000 cutthroat, 90,000 Mackinaw, and some 500,000 fry yet remained to be planted.

FIG. 41. Typical of what happens when an irrigation ditch is not successfully screened. More than 2100 sunfish are shown in the picture. This death toll was due to ineffective screening in Butte County. Photograph by A. E. Culver.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

WHO ARE THE CONSERVATIONISTS?

It seems to be the general impression among sportsmen that if the fish are to be saved from extermination by the commercial interests the sportsmen are the ones who will have to act. Their idea of conservation it appears is not to curb in any way the sportsmen themselves but to curb only those who catch and deal in fish as a livelihood. If we examine our laws which have been passed for the purpose of conserving our food fish it will be found that the sportsmen in nearly every instance have been specially favored. A good many kinds of fish have been taken off the commercial list and their sale prohibited. They may be taken only by angling and in several instances the angler is not restricted by a bag limit. If a closed season is established for the protection of an important food fish the sportsman is given the special privilege of fishing through the closed season.

Those who have had experience in enforcing fish and game laws know that the only way to make a closed season really effective is to prohibit the possession of the fish, bird or other animal during the season it is to be protected. The three salmon or five striped bass of any size which may be taken by any one for sport each day during the closed seasons for these fish make it difficult and in some instances well nigh impossible to enforce the ban against commercial fishing during the closed time or to enforce the law against the sale of striped bass under three pounds in weight. Other special privileges which sportsmen anglers enjoy are the areas and districts which are set aside for angling and closed to commercial fishing. When these closed areas are set down within a rich commercial fishing district such as the closed area at Catalina Island and the space of 750 feet about pleasure piers, jetties and breakwaters it not only makes the fisheries patrol by the Fish and Game Commission very difficult but it tends to keep alive the antagonism which usually exists between sport and commercial interests. Most of this antagonism is the result of sportsman-made laws and the lack of knowledge on the part of the sportsmen of the commercial fishing methods and conditions. Certainly one can not attend

several sessions of the state legislature and observe the passage or defeat of fish and game conservation measures and believe that sportsmen hold any monopoly on the desire for fish and game conservation.

Take for example the last session of the legislature. In the measures introduced or proposed there was ever present, on the part of sportsmen, the tendency to loosen up on the conservation laws where their pleasure was concerned. The greatly increased drain on our trout and our deer, caused by the building of good roads and the universal use of the automobile, make it advisable to cut down on the trout seasons and on the bag limits for both trout and deer. It is also urgent that the winter fishing for steelhead be stopped, for good trout fishing in our coast streams is largely dependent on preserving the large spawning steelheads. What was done? The sportsmen would not be satisfied with one buck a season, they wanted their two. The anglers did not want trout fishing restricted. Instead they wanted the daily bag limit increased and they did get the limit raised to thirty-five per day, but fortunately the bill was not signed. There was little chance to get winter steelhead fishing stopped. The tendency to loosen upon the game laws reached its climax in the serious proposal to permit the limited killing of mountain sheep by those who would be willing and able to pay a large fee. This proposal developed considerable opposition and the bill was not pushed. Such a bill has been up before and will come up again but will be defeated, more because it will be giving a special privilege to a few than because it is likely to exterminate the small remnant of our once abundant mountain sheep.

Legislation.

How did the commercial fishing measures fare? There were only two measures of prime importance from the standpoint of conservation. One was a measure which would prohibit the use of drag nets in southern California waters. It was believed the fishery would produce more if the drag net, which is very destructive to young halibut, was eliminated. The other was a measure which would give additional protection to salmon, shad and striped bass.

These measures were supported by most of the commercial fishing interests affected in spite of the fact that it meant a financial loss to them. They are for conservation for they have money invested in their business and they want their business to be permanent and continuous. It is necessary, of course, to convince the commercial fisherman or dealer that a species of fish needs protection or that the measures proposed for its protection are equitable and necessary. In the above instances this was not hard to do, except in the case of the striped bass. The evidences of overfishing are not as plain in the case of the striped bass as in that of the halibut, shad and salmon. Most of the angling clubs in the San Francisco bay and river regions believed that the striped bass needed radical restrictive measures passed for their protection. None of the measures proposed by them would restrict the angler in any way but most of the bills introduced would prohibit the use of nets for a period of five years. Such a measure was not necessary even if it could be put into practice. Due to a lack of knowledge of the fisheries, sportsmen could not see that if netting for striped bass were stopped that netting for salmon and shad in the same waters must stop at the same time. At first the radicals would not compromise but left the Fish and Game Commission, the California Fish, Game and Forest Protective League and the representatives of the commercial interests to work out measures which they considered equitable, less radical and in a large measure adequate. The measures thus adopted were finally passed by the legislature. The measures did not become effective in their entirety for the reason that the Governor failed to sign the bill which amended the law relating to the fish and game districts of the state. The principal reason for the failure of this bill was that it had many changes in the districts to please the sportsmen of local communities which were objectionable to sportsmen in other parts of the state.

Due to the failure of the "District Bill" to pass, netting was not stopped in the Sacramento River between Sacramento and Colusa, as intended, but netting was stopped above Colusa which is a very great protection to salmon as it eliminates the bar seining which was so destructive to the salmon which are virtually on their spawning grounds. The Sacramento River was closed to salmon netting during the months of June and July and the summer closed time for shad and striped bass begins now fifteen days earlier. Sea trolling for salmon is materially restricted. The seasons for salmon sea trolling in northern California waters are not what was agreed upon, due to the failure of the districting bill to become a law, but the salmon will not suffer on account of it.

The bill which prohibited the use of drag nets in southern California waters was passed and received the signature of the Governor. Due to the failure of the districting bill, the prohibition against drag nets applies to Santa Barbara County waters as was not the intention. An attempt is being made to remedy this by test cases in court.

The important conservation measures passed at the last session of the legislature were commercial fisheries measures and they were passed with the aid of the commercial fisheries interests. On the sport side of the ledger there were no conservation measures of importance passed and the important measures which were proposed, failed to pass for the reason that they were opposed by sportsmen.

Another bill which failed to meet with the approval of the Governor was one which would have permitted any reduction plant to use sardines without limit as to amount during four months of the year. This bill was originally introduced at the request of sardine canners who would reduce the amount of sardines a canner would be allowed to use for reduction purposes. At the request of the Fish and Game Commission changes were made in the bill so as to make the law easier of enforcement. When the bill came up in committee those who were anxious to obtain more and cheaper fish meal for poultry feed and fertilizer, those interested in reduction plants and machinery, as well as sardine canners who would make a profit on the side by means of their reduction plant, succeeded in getting the bill amended so that its meaning was quite different from what was originally intended. Many ingenious arguments were brought out in the talks before the committees. The best points brought out by those who would use sardines for reduction purposes were:

Sardines on the coast of California are very plentiful and in spite of the large catch of the past few years are more abundant now than they were ever known to be. It has never been proven that members of the herring family, to which the sardine belongs, have ever been exhausted at any place by overfishing. If there is any danger of overfishing here in California, the investigations being carried on by the Fish and Game Commission will show when they are being subjected to too great a strain and the fishing for reduction purposes can be restricted or stopped.

The better arguments in opposition were:

While there have been periods of scarcity in the past and sardines are apparently more plentiful now than for several years past, that is no sign they will continue to be abundant. Fish like the sardine are subject to great natural fluctuations in abundance and they probably will become as scarce again as they were in 1913, even if they are not subjected to heavy fishing. Any fishery can be depleted if great quantities of the fish are caught. If the menhaden, which is caught on our Atlantic coast in quantities as high as six hundred million pounds a year, does not show depletion, it is because no system of records or of investigations have been carried out which would show depletion, if it were occurring. Even if our sardine can stand much heavier fishing than it is being subjected to now, there is danger that a great reduction industry will gain a foothold which can not be shaken loose when depletion is shown, and our sardine industry, which should be of the most value because per ton of fish it would give employment to more people and the finished product would be of greater value, would be jeopardized. The arguments in favor of using them for reduction until depletion can be shown, won out with the legislature but they did not win out with the Governor.

The most interesting contest over fisheries legislation was that which arose over the bill of Senator Sample of San Diego which prohibited the use of purse seines for barracuda, mackerel or any small fish, for it did not permit a purse seine to be used with meshes measuring less than four inches. The bill also prohibited the catching of barracuda with lampara or round-haul nets. The bill was introduced at the request of the organization of fishermen of San Diego who are principally gill-net fishermen and who are opposed most strongly by the purse seine and lampara fishermen and by the wholesale fish dealers of San Pedro.

The Fish and Game Commission knowing of the growing opposition to the nets which have been recently introduced and which have interfered economically with the gill net fishermen, employed Tage Skogsberg, a competent investigator, then on its staff, to make as thorough an investigation as was possible during the season prior to the meeting of the legislature. His conclusion was that there were no data to show that the use of purse and round-haul nets was depleting the barracuda as claimed. (See CALIFORNIA FISH AND GAME, July, 1923, p. 87.)

If it was a question of conserving the barracuda a short closed season during the time they were schooling in April and May, preparatory to spawning, would be sufficient. The fresh fish markets he found were dependent on these nets for their winter supply of fish and he recommended that no radical legislation be passed, such as limiting the size of mesh of the purse seine, for that would result in putting purse seiners out of business. He recommended that an investigation be undertaken on the barracuda similar to those being carried out on the albacore and sardine, in order that depletion may be detected in time to prevent serious results. Mr. Skogsberg's report was the only real evidence presented in the discussion, but it was not sufficient to prevent the passage of the bill. It was sufficient, however, to convince the Governor and the bill was not signed.

THE LAMPARA NET.

Whenever a new and improved type of fishing gear is introduced and it upsets the old economic order, there is immediate opposition. This opposition almost always has used the argument that the new type of net is destructive to young fish and to the spawn of the fish, or that it wastes the mature fish by making catches which glut the market and waste results on that account. The introduction of beam trawling in the North Sea and later the larger otter trawl brought on a bitter fight against their use by the inshore fishermen and lasted for many years. The disputes were the subject of several investigations by different boards appointed in England and Scotland and in some of the other countries bordering the North Sea.

At first, restrictive legislation was adopted which, in the light of later information it was deemed best to remove or modify. In our own state the first use of paranzella nets or trawls by steam tugs outside of San Francisco harbor brought forth protests from the other fishermen. The introduction of the lampara net in the sardine fishery at Monterey met with the same kind of opposition and at the 1913 session of our legislature was near to being outlawed. Yet it would be hard to devise a net which would cause less undue destruction of fish. If the legislation had been passed by the legislature of 1913 it would have been a serious blow to the future of the sardine industry for the present huge proportions of our sardine industry has been made possible largely by the introduction of the lampara net.

PROTECTION OF SALMON ESSENTIAL.

We have had a great many complaints about the salmon season closing too early at this place and that place, that fishermen were no longer able to make a living fishing for salmon and that there should be a longer open season at various places in California.

Permit us at this time to say to the fisherman, that we truthfully feel sorry for him. For the following shows the writing on the wall. The catch of salmon in California in 1919 was 13,145,728 pounds; 1920 was 11,133,819 pounds; 1921 was 7,990,932 pounds, and 1922 was 7,235,124 pounds. The catch for 1923 has not been completed but we are sure it will be far less than that of 1922.

Something had to be done in order that salmon would not become extinct. Power dams being constructed on rivers frequented by salmon, intense fishing for salmon in ocean waters, as well as in the rivers, made it necessary to shorten the time that salmon could be caught commercially.

The catch at Monterey Bay, including Santa Cruz, was almost a complete failure this year, although the catch in the ocean waters outside of San Francisco was fair, it will not come up to the catch of 1922.

At Noyo, near Fort Bragg, which is a very busy salmon fishing center, it was necessary for the plants at this point to close down much earlier this year than in former years, due to a very bad entrance to Noyo River and also due to a scarcity of fish. These plants closed the latter part of July, while in former years they ran during the month of September.

At Shelter Cove there was a good run of large fish the middle of July and this run continued until the close of the season, August 15th.

Off Eureka there was a good run of salmon until the latter part of July, after this date fairly good catches of salmon were made off Trinidad. These fish were picked up by buyer boats from the various fish companies and taken to Eureka.

On the Klamath River, at Requa, the run of salmon was very late and during the latter part of July and the first part of August, practically no fish were caught. The catch for the season will be far less than that of 1922.—E. D.

THE SARDINE SEASON AT MONTEREY.

The sardine canning season this year at Monterey started in May, a month earlier

than usual and promises to surpass any season since the war. Following the war there was a decided slump (1921) in the amount of sardines taken with a partial recovery in 1922 and the 1923 figures will probably show a complete recovery and the business running again on a normal basis. Sardine fishing at Monterey is conducted during ten months of the year, April and May being the off months. The figures published by the Fish and Game Commission show the catch summarized by calendar years and the cannery operators figure their seasons from January 1, to December 31, but as the canneries are closed down during part of the spring months it is, in some ways, more logical to figure the total catch by fishing seasons rather than calendar years. In the following table the total sardine catch of Monterey County is shown by fishing seasons, that is from May 1, of one year, to April 30, of the following calendar year. For simplicity, the figures have been rounded off to the nearest million pounds:

1916-1917	15,000,000 lbs.
1917-1918	46,000,000 lbs.
1918-1919	72,000,000 lbs.
1919-1920	86,000,000 lbs.
1920-1921	50,000,000 lbs.
1921-1922	33,000,000 lbs.
1922-1923	58,000,000 lbs.

These figures show the rapid increase in catch during the war, with the drop in 1920-21. The financial slump hit the cannery business a little later than in most other industries over the country as a whole and is reflected in the small take of 1921-22. Last fishing season (1922-23) shows an upward trend. This present season has started with most encouraging prospects as the demand for our coast sardines seems to be much stronger than during the past three seasons.

At present, seven of the Monterey packing plants are operating and employing about 25 fishing crews. The K. Hovden Company has purchased the nearby plant, formerly known as the Great Western, and will operate it as the K. Hovden Plant No. 2. The Carmel Canning Company has made extensive improvements, including a new building that nearly doubles their floor space and the addition of a reduction plant for offal. One innovation at this plant is interesting all plant managers who have had trouble with seaweed and debris clogging the intake pipes of their water supply. A well was sunk in the rock under the cannery with a horizontal drift just under the water of the bay. The roof of the drift was then shot out so that loose rock filled in, thus allowing an abundant supply of seawater to flow in after straining through the broken rock. The results are highly satisfactory.—W. L. S.

SARDINE FISHERMEN'S STRIKE AT MONTEREY, AND SETTLEMENT.

The sardine fishermen at Monterey were on a strike from September 17th to 24th. During this time 250 fishermen and several hundred cannery helpers were tied up. The main reason for the strike was dissatisfaction on the part of fishermen as to the two different prices paid for the sardines, those used for canning, and sardines used for reduction purposes. The fishermen felt that they did not always get paid for the full amount of fish delivered and that they had no way of checking whether the fish were used for reduction purposes, or for canning.

The question of weights was settled by calling in the State and County Sealer of Weights and Measures. As a result the canners were ordered to install uniform measuring buckets, and the round metal bucket, such as the one used by the K. Hovden plant, was agreed upon as the standard. All plants operating at Monterey have installed this uniform measure.

At first there was a deadlock in the negotiations on the question of a uniform price of $10 per ton for the fish. Representatives of both sides of the controversy were induced to meet with representatives of the Monterey Chamber of Commerce, and finally reached an agreement on the following basis:

Price to be $10 per ton for all sardines.

No crew to fish for a limit of less than ten tons.

The crews fishing at present are considered sufficient for the plants now operating, no new crews to be taken on.

Number of crews per plant to be determined by plant capacity and a twelve-ton limit per boat.

Payment for fish delivered over the limit (when a limit is set) to go to the Fishermen's organization, and not to the individual fishermen.

No donations of fish to the canner allowed.

The crew to be fined $500 for each donation proven.

Canner to deal only with the Fishermen's organization and not with individual crew captains.

Canner to order before 4 o'clock p.m. from the Fishermen's organization the lump tonnage he desires the following day.

The Fishermen's organization sets individual boat limits and the number of crews (if necessary) to comply with the canner's order for that day.

All deliveries to be measured in the standard metal bucket.

Crew captains (possibly the individual fishermen) will be paid by the organization and not by the canner, on the basis of tonnage shown by the official receipts

of the State Fish and Game Commission.
The canner pays for the fish received in a lump sum to the Fishermen's organization twice a month.
Disputes in future to be submitted to arbitration before a strike is called. An arbitration board to consist of three: A representative of the fishermen, and a representative of the packers, these two to choose a third, an outsider.

When a crew is set a definite limit by its organization and delivers an excess, the payment for that excess goes into the treasury of the organization and the crew receives nothing for it. Also, during periods of so-called scarcity of fish, the canner need not order a definite tonnage, but may order a total catch of the usual number of crews fishing for his plant. This is just as in the past, when limits were removed during scarcity.

If this agreement holds, it will settle several of the difficulties of the Fish and Game Commission's administration. Most important of all, it will insure the delivered tonnage of fish being recorded on the official receipts issued by the canner to the fishermen, also, minor questions will be easier to handle, such as overcatches and the dumping of fish. Although these matters have been agreed upon by both sides in the controversy, it appears to be difficult for some of the canners to adjust themselves to the revolutionary idea of dealing with the Fishermen's organization, rather than with the separate crew of captains.—W. L. S.

HALIBUT IN CALIFORNIA.

Fishing boats working out of Eureka, California, this year have made some fairly good catches of "Northern" halibut, sufficient to stock the San Francisco market. The halibut is supposed to be scarce on the coast of California, although the large flounder known locally as "California" halibut is plentiful, especially in the southern part of the state.

The Western California Fish Company of San Francisco equipped several boats to fish for halibut off the Eureka coast, as an experiment, with the result that good catches were made. The halibut caught were fine big fish, in excellent condition, and with properly equipped boats, we feel confident good catches will continue to be made.—E. D.

WATER POLLUTION.

The State of California, through the Fish and Game Commission, has done a great deal to prevent the pollution of our waters with oil, mill and factory waste. It even has succeeded in getting some good laws on the statute books, but a great deal of work remains to be done.

Due to the great development of the oil industry in this state, our greatest problem is in the mattter of oil pollution. The oil is piped from the oil fields to our harbors, where it is stored, refined and loaded on ships for fuel and transportation.

At the present time the Fish and Game Commission has the cooperation of the various oil companies, shipyards, steamship companies and railroads in preventing oil from getting into our waters. With all this the oil frequently gets away, through accident or carelessness and causes great damage to harbors, loss to bathing beaches, pleasure boats and other water craft. The piling around the various piers become covered with oil which adds greatly to the fire hazards. Recently it became necessary for the San Francisco Harbor Commission to post signs on all wharves along the water front, prohibiting smoking. This was due to the fact that the pilings were saturated with oil and to prevent disastrous fires, these measures were taken.

The principal concern of the Fish and Game Commission is the damage and destruction to bird and fish life. The feathers of the various kinds of waterfowl become saturated with oil, so that they can not fly and sooner or later die. The loss of water birds, such as wild ducks, from this cause is at times very serious.

Young clams on the beaches and mud flats are killed by coming in contact with the oil. The fish are damaged indirectly by lack of food, caused by the oil killing the diatoms and other plankton which form the basis of the food supply for our fish. It may be that oil pollution is a more serious menace to the fish of our inland waters than overfishing.

Some of the worst offenders are ships that come into our harbors, which after unloading their cargoes, and before taking on a new supply of fuel oil, pump the ship's bilges into the bay. Shipyards that repair tankers, or oil carrying barges, are sometimes careless in taking care of oil that comes from these ships, also garages that empty their greases into the public sewers, which in many instances empty into rivers or bays.

To stop all pollution of our waters, this Commission invites the cooperation of all civic organizations, the assistance and cooperation of all manufacturing plants, oil companies, shipyards, steamship companies, railroads, garages and gas companies, and we are sure that with the help of these organizations, it will be possible to keep the waters of California clean.—E. D.

CONSERVATION IN OTHER STATES.

NEW GAME PRESERVES FOR LOUISIANA.

Edward Avery McIlhenny, donor to the State of Louisiana of the Rockefeller-Sage and Rainey-McIlhenny game preserves has recently acquired additional land which, added to what he already owned, will give him control of a total of 100,000 acres of land in the game regions along the gulf coast. Mr. McIlhenny announces that game will be protected on this area, which means that wild life will now be safeguarded on all of the territory from the mouth of the Mississippi to Texas along the Gulf coast line for a distance of 75 miles and an area of 700 square miles inland. For several years Mr. McIlhenny has been following a broad and far-sighted policy of game conservation. This 100,000 acres, though very fertile land is not being developed for agricultural purposes. Instead, an interlacing system of ponds, canals and lakes is being laid out and the whole region planted with the food plants of wild game birds. This provides permanent feeding grounds on protected areas for the millions of waterfowl and other game birds which annually migrate to this region. Many game animals and fur-bearers also frequent these feeding grounds and a force of wardens is employed by Mr. McIlhenny to see that the game laws are enforced. Who will do as much for California?

HUNTING ACCIDENTS REDUCED IN WYOMING.

Game laws in Wyoming now require every hunter to wear some distinguishing mark on his hat. The last Biennial Report of the Wyoming Fish and Game Commission reports that no accidents occurred during the 1921 open season and this is attributed to this new law.

COMMON SENSE.

"The man who violates the fish and game laws is cheating you. Help us to educate him, or to punish him if he is a wilful offender."—New Jersey Fish and Game Commission.

DEPREDATIONS OF DEER IN NEW JERSEY NEGLIGIBLE.

New Jersey allows the killing of deer trespassing upon cultivated lands. The person killing a deer because of depredations must report to the Fish and Game Commission within 48 hours. The fact that but two deer were so killed and reported makes it evident that depredations by these animals have been greatly exaggerated. Every state which has provided for remuneration for the damage of crops has proved the same thing.

NEW JERSEY TO INTRODUCE RABBITS.

New Jersey is now planning the introduction of snowshoe rabbits. However, inability to secure a supply from other states is causing some delay in carrying out the plan.

MINNESOTA REPORTS DEER DEPLETION.

The 1922 Biennial Report of the Minnesota Fish and Game Commission records a kill of 18,000 deer annually. Minnesota is one of the only states in the Union that still allows the killing of does and fawns and it is estimated that half of the total kill is made up of animals of these categories. The Commissioner reports a steady depletion in the deer as a result of extensive hunting and the destruction of does and fawns.

Apparently it is almost impossible for one state to profit by the experience of another. It must experience evident depletion itself before taking measures to conserve a supply. The trouble is, quite often these measures come altogether too late to give satisfactory results.

Minnesota now boasts of 69 game refuges. Many of them, however, are of small size.

Fur farming is to be a considerable industry in Minnesota for the breeding stock of the various game farms is valued at $657,390. There are 1600 foxes and 375 skunks used as breeding stock on the various fur farms.

VERMONT NOW HAS BUCK LAW.

The Biennial Report of the Vermont Fish and Game Commission reports a reduction in the deer kill from 4477 in 1920, to 1507 in 1921, with the inauguration of the buck law. Doubling of the season from 6 days to 12 days gave only about one-third the normal kill when both does and bucks were allowed to be killed.

NEW MEXICO PROVIDES RESTING AREAS FOR WATERFOWL.

New Mexico has provided nine resting areas for ducks on the Rio Grande River. Certain areas located below some of the more prominent bridges across the river are designated as resting areas and the penalty for shooting on these areas is set at a fine not exceeding $300 and imprisonment not exceeding 30 days.

FAVORITE LAKE FOR BIRDS SAVED TO MINNESOTA.

Swan Lake, a valuable and unusual body of water about 10,500 acres in area, located in Nicollet County, Minn., has been saved to the state through the efforts of the State Game and Fish Commissioners, the Biological Survey of the United States Department of Agriculture and landowners and local conservationists of the region. A movement to lower the level of the lake four feet, eventually draining it entirely, was successfully opposed and defeated at two hearings after an examination of the wild fowl and food plant value of the lake had been made by three representatives of the Biological Survey.

In deciding this case the District Court in Minnesota laid emphasis on the great importance to the public welfare of such bodies of water as Swan Lake. Its favorable location, its relatively shallow fresh water, and its abundant growth of vegetation suitable for cover, nesting sites, and food have made it an attractive resort for many kinds of waterfowl. Its margins and wooded islands are a valuable asset in the conservation not only of game birds but also of insectivorous birds useful to farmers. Among the water birds that breed on the lake are several species of ducks, including mallards, blue-winged teal, redheads, lesser scaup, and ruddy ducks; sora rails, Florida gallinules, American coots, four species of grebes, black terns, and black-crowned night-herons are also common.

At least 50 kinds of plants valuable as food for water birds grow in this lake, including practically all the best duck food plants of the United States. There is also an abundance of fresh-water snails of several species liked by water birds. Lowering the level of this lake materially would eventually cause the disappearance of its present kind of vegetation and gradually destroy its value as a waterfowl resort.

WEST VIRGINIA ESTABLISHES REFUGES.

West Virginia is one of the later states to join the conservation movement, its Game and Fish Commission having been created in 1921 and its fish and game code enacted by the legislature of that same year. It is, however, pursuing an intelligent and vigorous policy of protecting and building up its many resources of forest and stream and it appears that these efforts are meeting with satisfactory response. Appreciation of the value of game preserves is evidenced in the statement of the Chief Game Protector, Mr. A. B. Brooks, in the July bulletin of the American Game Protective Association. "The West Virginia law authorizes the purchase and protection of lands for park and game preserve purposes; but since the total revenue for forest, fish and game work is derived from hunting and fishing license fees, the funds necessary for these purposes are not yet available. To avoid waste of time, however, the commission is establishing game refuges on privately owned lands. Seven such refuges have been set aside, having a combined area of about 22,000 acres. This number will be increased as rapidly as possible."

INCREASED LICENSE FEES.

During the past year, increased license fees were provided for in Pennsylvania, Tennessee, Utah, Manitoba, Northwest Territories, and New Brunswick. Evidently Canada is just as progressive as the United States. If sportsmen continue their demands for more and more fish and for better patrol service, increased funds will be necessary. There has been increasing sentiment favoring a higher license fee for the angler. Proposed legislation looking in this direction failed to receive favorable action at the last legislature.

NEVADA ESTABLISHES GAME REFUGES.

A new Nevada law authorizes the governor to select and set aside areas of the public domain, not exceeding 25 in number, as recreation grounds and game refuges. On June 30th a proclamation was issued setting aside recreation grounds and game refuges as follows: Jarbidge, approximately 40,300 acres, and Humboldt, approximately 206,800 acres, in Elko County; Santa Rosa, approximately 64,000 acres, in Humboldt County; Grant, approximately 377,500 acres, and Reese River, approximately 198,500 acres, in Nye County, and an addition to the Grant refuge, approximately 25,600 acres, in Lincoln County; Lehman, approximately 175,512 acres, and Schell Creek, approximately 70,400 acres, in White County; an antelope preserve in Washoe County, comprising that portion of the public domain north of township 33 north; a sanctuary for quail and pheasants, extending from the north bank of the Truckee River to a line parallel with it and one mile uniformly distant, limited on the west by the Glendale bridge and on the east by the Derby dam; a refuge in Clark County, comprising that portion of the

public domain lying between the south line of township 16 south and the north line of township 22 south, ranges 55 to 58 east, comprising approximately 403,200 acres; and a refuge in Lander County, located on Birch, Kingston, Washington, and Big Creeks.—U. S. Dept. Agric. Farmers' Bull., No. 1375.

MICHIGAN HITS SHOOTING MONOPOLY.

To prevent the monopolizing of shooting rights, Michigan has enacted a law which restricts the size of private preserves of hunting grounds to not more than 15,000 acres in one tract, and prohibits the establishment of a new preserve within two miles of one already in existence.

FRANCE ENTERTAINS PROTECTIONISTS.

France, as represented by the Societe d'Acclimatation de France and the Litue pour la Protection des Oiseaux, held an International Conference on the Protection of Nature, "Sites et Monuments Naturels," during June, 1923. M. Delacour, President of the Ligue, presided over the section dealing with fauna. Reserves, public parks and gardens, as well as wild life conservation were subjects for discussion.

REPORTS.

STATEMENT OF INCOME.

For the Period July 1, 1922, to June 30, 1923, of the Seventy-fourth Fiscal Year.

License Sales:	Detail	Total
Angling	$217,077 00	
Hunting	249,521 00	
Market fishermen's	46,510 00	
Wholesale fish packers'	1,170 00	
Trapping	3,119 00	
Game breeders'	152 50	
Fish breeders'	40 00	
Fish importers'	5 00	
Kelp	10 00	
Total license sales		$517,604 50
Other Income:		
Court fines	$30,803 00	
Fish tag sales	3,111 09	
Fish packers' tax	38,033 44	
Game tag sales	7 01	
Sale of nets	140 00	
Sale of launch	60 00	
Sale of typewriter	22 50	
Crawfish inspection	210 00	
Total other income		72,387 04
Total income		$589,991 54

STATEMENT OF INCOME.

For the Period April 1, 1923, to June 30, 1923, of the Seventy-fourth Fiscal Year.

License Sales:	Detail	Total
Angling	$78,317 00	
Hunting	32,954 00	
Market fishermen's	17,830 00	
Wholesale fish packers'	90 00	
Trapping	321 00	
Game breeders'	87 50	
Fish breeders'	5 00	
Total license sales		$129,604 50
Other Income:		
Court fines	$7,653 00	
Fish tag sales	326 10	
Fish packers' tax	28,711 84	
Sales of nets	140 00	
Sale of launch	60 00	
Sale of typewriter	22 50	
Crawfish inspection	210 00	
Total other income		$37,123 44
Total income		$166,727 94

STATEMENT OF EXPENDITURES.

For the Period July 1, 1922, to June 30, 1923, of the Seventy-fourth Fiscal Year.

Function	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Commissioners			$546 35		$546 35
Executive offices	$346 32	$16,173 20	5,737 46	$903 78	23,160 76
Printing			4,149 13		4,149 13
Research and publicity	226 71	4,339 27	695 28	370 00	5,631 26
Accident and death claims			2,702 43		2,702 43
Department totals	$573 03	$20,512 47	$13,830 65	$1,273 78	$36,189 93
Commercial fisheulture and conservation:					
Superintendence	$137 24	$10,381 58	$5,398 05	$219 37	$16,136 24
Inspection and patrol	4,694 25	21,798 19	6,756 84	194 74	33,444 02
Research	200 65	17,204 28	2,166 35	314 13	19,885 41
Statistics	676 02	4,698 87	158 51	5 25	5,538 65
Market fishing license commissions			482 00		482 00
Propagation and distribution of salmon	6,674 27	14,033 92	988 80	594 50	22,291 49
Department totals	$12,382 43	$68,116 84	$15,950 55	$1,327 99	$97,777 81
Sporting fisheulture and conservation:					
Superintendence	$362 62	$10,286 31	$29,828 78	$6 25	$40,483 96
General patrol (40 per cent)	1,067 36	48,185 27	31,126 46	268 93	80,648 02
Propagation and distribution of trout	26,730 12	61,740 16	23,498 76	5,938 80	117,907 84
Department totals	$28,160 10	$120,211 74	$84,454 00	$6,213 98	$239,039 82
Game conservation:					
Superintendence		$1,528 06	$36,564 91		$38,092 97
General patrol (60 per cent)	$1,601 04	72,277 90	46,689 69	$403 39	120,972 02
Department totals	$1,601 04	$73,805 96	$83,254 60	$403 39	$159,064 99
Tahoe camping ground	$120 82	$659 25	$19 08		$799 15
Grand totals	$42,837 42	$283,306 26	$197,508 88	$9,219 14	$532,871 70

STATEMENT OF EXPENDITURES.

For the Period April 1, 1923, to June 30, 1923, of the Seventy-fourth Fiscal Year.

Function	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Commissioners			$147 52		$147 52
Executive offices	$221 39	$4,170 66	1,422 74	$687 73	6,502 52
Printing			845 04		845 04
Research and publicity	—95	1,050 00	1 20		1,050 25
Accident and death claims			752 77		752 77
Department totals	$220 44	$5,220 66	$3,169 27	$687 73	$9,298 10
Commercial fisheulture and conservation:					
Superintendence	$63 41	$2,665 00	$1,873 75	$168 32	$4,770 48
Inspection and patrol	2,193 59	5,635 00	2,144 16	72 90	10,045 65
Research	38 10	3,961 73	206 57	110 70	4,317 10
Statistics	674 94	1,110 00	74 19	5 25	1,864 38
Market fishing license commissions			156 00		156 00
Propagation and distribution of salmon	2,508 35	2,426 32	180 28	518 83	5,633 78
Department totals	$5,478 39	$15,798 05	$4,634 95	$876 00	$26,787 39
Sporting fisheulture and conservation:					
Superintendence	$72 19	$2,440 50	$9,254 14		$11,763 83
General patrol (40 per cent)	502 77	12,074 07	7,926 64	$253 25	20,756 73
Propagation and distribution of trout	9,917 86	18,786 21	3,652 45	5,702 29	38,058 81
Department totals	$10,492 82	$33,300 78	$20,833 23	$5,955 54	$70,582 37
Game conservation:					
Superintendence		$300 00	$11,418 98		$11,718 98
General patrol (60 per cent)	$754 14	18,111 09	11,889 97	$379 87	$31,135 07
Department totals	$754 14	$18,411 09	$23,308 95	$379 87	$42,854 05
Tahoe camping ground	$112 22	$195 00	$16 83		$324 05
Grand totals	$17,058 01	$72,925 58	$51,963 23	$7,899 14	$149,845 96

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF APRIL, MAY AND JUNE, 1923.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino Sonoma, Lake	Marin	Solano, Yolo	Tehama, Colusa, Glenn, Butte	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego
Albacore												181,158	140	26,199	207,797		
Anchovies								5,100		2,275		5,788			13,163		
Barracuda											749	2,833,534	27,032	343,822	3,205,137	120,224	2,170
Bluefish									90	13,477					13,567		
Boccaccio	13							12,942	92,215	129,308	5,203				239,681		
Bonito												4,804		4,358	9,162		730
Carp						1,374	35,642	7,654							44,670		
Catfish		5,169		442		23,509	59								29,179		
Chilipepper								20,570	805						21,375		
Cultus Cod	1,956	211	332					27,221	6,379	8,309				109	44,517		
Dolphin																	
Eels														117	117		
Flounders	529		31	1,974			2,299	39,443	6,178	880		156		67	51,557		
Grayfish								2,424				2,230		73,878	78,532		
Greenfish																	
Hake								20,357	3,512						23,869		
Halibut	31,640	128						5,055	2,641	1,943	82,378	241,046	22,102	68,501	458,434	13,307	101,192
Hardhead																	
Herring			800					300	30						1,130		
Kingfish									14,682	85,306		34,080		3,481	137,549	7,700	20
Mackerel									40	62,356	371	473,571	21,428	83,368	641,131	200	255
Marlin																	
Mullet														2,850	2,850	300	9,503
Perch	6,891		2,290				40	10,706	1,026	3,853	564	35,958		160	61,491		
Pike						70	277	88							435		
Pompano								16		74		6,503	10	261	6,861		
Rock Bass											817	57,352	2,583	57,378	118,130	2,238	270
Rockfish	1,008	359	3,037					69,806	32,178	91,301	19,073	243,995	7,946	259,625	728,328	160	5,582
Sablefish								101,795	10,670	247					115,712		
Salmon	482,408	386,041	11,693	82,328	26,801	154,256	236,773	546,064	256,912	372,225					2,555,504		
Sandabs								301,503	51,604	1,246	133	3,383	233		361,102		
Sardines								84,390		2,002,150		5,801,807		964,760	8,856,107		
Sculpin												12,481	22	7,011	19,514		
Sea Bass—Black											600	11,138	188	13,070	24,996	165	7,960
Sea Bass—White										23	19,418	762,943	5,169	96,191	883,744	58,665	29,645
Sea Trout										38				1,878	1,916		1,955
Shad						160	937	24,375							25,472		
Shad—Buck				43,467		21,679	309,692	27							374,865		
Shad—Roe				104,603		37,176	631,077								772,856		

Sheepshead											148	174		1,650	1,972		
Skates								21,775	1,125	325		85			23,310		
Skipjack																	
Smelt	5,015		18,670				82	12,091	6,213	939	19,147	76,370	724	1,196	140,447		80
Sole	315		182				270	1,330,428	213 328	40,220	19,888	9,629	2,073	1,520	1,617,853		482
Splittail						20									20		
Striped Bass			740	40,025		97,952	224,211	51,980							414,908		
Stingaree																	
Suckers																	
Surf Fish																	
Swordfish																	
Tomcod								2,957							2,957		
Trout—Farm																	
Trout—Steelhead																	
Tuna												137,645			137,645	142,547	
Tuna—Bluefin												571,568		818,443	1,390,011		
Tuna—Yellowfin																278,539	
Turbot			129												129		
Whitebait	15,252		751					21,928		830					38,761		
Whitefish												3,333	595	780	4,708	118	
Yellowtail												275,776	1,398	561,734	838,908	12,475	2,238
Miscellaneous	200			406		12	17	14,279	1,981	1,041	2,240	22,913	131	2,850	46,070	1,710	1,150
Total Fish	548,230	391,908	38,655	273,245	26,804	336,208	1,441.376	2,738,274	704,609	2,818,366	170,729	11,812,720	91,774	3,395,257	24,788,155	638,348	163,532
Crustaceans:																	
Crabs	[1]64,296	[2]48	[3]792					[6]97,992	[8]3,312	[10]408					166,848		
Ecrevisse																	
Shrimps			87,197					120,933							208,130		
Spiny Lobsters																	66,693
Mollusks:																	
Abalones									15	538,554	11,010				549,579	7,575	
Clams—Cockle	1,712		9,416									2,250			13,378		
Clams—Mixed	1,084		2,985												4,069		
Clams—Pismo											59,245				59,245		
Clams—Softshell			19,920				36,443	11,799							68,162		
Cuttlefish			219					2,085	9,647	11,154		169			23,274		
Limpets																	
Mussels			230				197	1,018		2,600	60		19,100		23,205		
Oysters—Eastern			[4]77,924					[7]54,725							132,649		
Oysters—Native																	
Snails																	
Squid										889,986					889,986		
Miscellaneous:																	
Frogs																	
Terrapins						[5]72									72		
Turtles																	
Totals	615,322	391,956	237,338	273,245	26,804	336,280	1,478,016	3,026,826	717,583	4,261,068	241,044	11,815,139	110,874	3,395,257	26,926,752	645,923	230,225

All amounts shown in pounds. Albacore cleaned. [1]2,679 doz. [2]2 doz. [3]33 doz. [4]354,200 shell oysters. [5]3 doz. [6]4,083 doz. [7]248,750 shell oysters. [8]138 doz. [10]17 doz.

VIOLATIONS OF FISH AND GAME LAWS, FISCAL YEAR 1922-1923.

	1922		1923	
HUNTING.	July-Sept.	Oct.-Dec.	Jan.-April	March-June
Without hunting license	25	36	16	5
License, failure to show	1	5		
Quail, closed season	15	13	1	
Quail, sale of				1
Quail, trapping of		1		
Wild pigeons, closed season	1	9	9	2
Grouse, closed season	1			1
Sage-hens, closed season	2			1
Pheasants, closed season	2		2	
Ducks, closed season	17		22	4
Ducks, over limit		6		
Mud hens, closed season	1			
Geese, closed season			1	2
Geese, over limit		3		
Shore birds, closed season		19	2	
Doves, closed season	21			2
Non-game birds	2	18	10	5
Rabbits	10	3	2	4
Squirrels			1	
Deer, closed season	19	15	26	8
Deer, killing of does and fawns	5	8	5	1
Deer, over limit		1		
Deer, dogs, closed season		2		1
Deer, illegal heads or hides	5	9		
Mountain sheep				1
Shooting from auto	2	1		
Shooting from power boat		5		
Hunting in game refuge	3	2	3	6
Nighting hunting	1	27	6	
Trespassing		16		1
Totals	165	201	108	45
FISHING.				
Without angling license	10	6	15	40
Trout, closed season		1	31	33
Trout, over limit	5	5	4	24
Trout, illegally taken	10	2	2	5
Salmon, over limit		1	1	
Salmon, illegal sale		1		
Salmon, illegal spearing	2			
Black bass, closed season			2	7
Black bass, under size	3			6
Black bass, buy or sell	2			
Striped bass, over limit	5	1		2
Striped bass, under size	5	1		21
Striped bass, over size				1
Striped bass, illegal sale	2	1	1	
Crappie, closed season			1	
Sunfish, closed season				1
Perch, closed season				1
Perch, sale			1	
Catfish, sale of undersized			2	
Barracuda, undersize	2			8
Halibut, undersize		3		
Sturgeon, closed season	2			
Abalones, closed season			6	
Abalones, undersize	2	5	1	25
Abalones, over limit	1	4		9
Abalones, illegal shipment			1	
Abalones, drying	1			
Abalones, brought ashore dead		1		
Clams, closed season				1
Clams, over limit	2	7	12	6
Clams, undersize	7	26	28	8
Clams, illegal shipment			1	
Crabs, undersize		3	6	7

VIOLATIONS OF FISH AND GAME LAWS, FISCAL YEAR 1922-1923—Cont'd.

FISHING—Continued.	1922 July-Sept.	1922 Oct.-Dec.	1923 Jan.-April	1923 March-June
Crabs, illegal shipment			2	2
Lobsters, closed season	2		1	3
Lobsters, undersize		18	2	
Lobsters, oversize		3		
Within 250 feet of fishway		2	4	7
Taking from spawning station				2
Killing fish with dynamite	1		1	
Obstruction in stream				1
Night fishing	3			5
Without commercial license	43	2	2	
Destroy food fish			1	
Illegal use nets, traps, lines, etc.	16	7	5	16
Commercial fishery data; failure to keep			1	
Ship fish by parcel post	1			
Water pollution			2	
Totals	128	100	137	250

CASES.

Recapitulation (as of December 1, 1923). July 1, 1922, to June 30, 1923.

	July, Aug., Sept.	Oct., Nov., Dec.	Jan., Feb., March	April, May, June	Total for year
Convictions	228	227	198	232	885
Bail forfeited	19	30	2	19	70
Sentence suspended	28	33	21	31	113
Pending	9	2	3	3	17
Dismissal-acquittal	7	4	9	6	26
Juvenile	2	5	12	4	23
Total arrests by quarters	293	301	245	295	
Total arrests for year					1,134

ARRESTS, FISCAL YEAR, JULY 1, 1922–JUNE 30, 1923.

Nationality	1922 July-Sept.	1922 Oct.-Dec.	1923 Jan.-March	1923 April-June	Totals
Citizen	133	138	143	155	569
Armenia	1				1
Austria	20	3	4	4	31
Canada				1	1
China	2		4		6
England	1			2	3
France	1	5	1	13	20
Greece	4	6	2	2	14
Germany			2	5	7
Guatemala	1				1
Ireland	1	2		1	4
Italy	33	38	28	23	122
Japan	13	10	13	20	56
Mexico	4	2	2	1	9
Norway		2		1	3
Portugal	6	15	5	6	42
Russia	2	2			4
Scotland				1	1
South Wales			1		1
Spain		1		3	4
Sicily		2			2
Serbia	1	1			2
Sweden	3	2		2	7
Switzerland	1		2		3
Not given	66	72	37	55	230
Totals	293	301	245	295	1,133

SEIZURES, FISCAL YEAR, 1922–1923.

	1922 July-Sept.	1922 Oct.-Dec.	1923 Jan.-March	1923 April-June
Ducks	284	2,478	706	8
Geese		51	10	4
Shore birds		27	12	
Quail	11	53	14	
Grouse	1			2
Sage-hens	27			
Wild pigeons		9	5	1
Doves	79			
Pheasants			3	
Non-game birds		7	31	
Deer meat (pounds)	543	259	412½	77
Deer hides	2	1	2	
Mountain sheep heads				2
Rabbits	21	4		1
Trout	108	33	9	657
Trout (pounds)		574½	235½	74¾
Salmon (pounds)	1,151	834	927	89½
Catfish (pounds)			177	
Black bass	44			102
Striped bass	183			103
Striped bass (pounds)	964	544½	173	342
Barracuda (pounds)	875	600		11,431
Halibut (pounds)		1,050		
Sturgeon (pounds)	254			
Whitebait (pounds)				40
Crappie				8
Sunfish				44
Hardhead				31
Crab	2,188	1,873	271	671
Crab meat (pounds)		10		85
Lobster	70	145	25	
Lobster (pounds)	100	1,536		507
Lobster	1 box		15 boxes	10 sacks
Abalone	117	125	162	308
Clam	240	1,075	271	845
Clam (pounds)			40	
Mussel	260			
Shrimp (pounds)			10	
Shrimp meat (pounds)				160

INDEX TO VOLUME 9.

A

Abalone, 39, 66, 81, 115, 127, 179.
Abels, H. J., 57.
Accident, hunting, 154; reduced in Wyoming, 174; *see* hunting.
Act, 34.
  Lacey, 34.
  Migratory Bird Treaty, 34, 119, 162.
  Migratory Birds' Convention, 101, 102.
Adams, C. C., 33.
Administration, 69, 84, 120.
  Fish and game, 26, 55, 103.
Albacore, 38, 40, 80, 93, 115, 126, 171, 178; fishery worries cannerymen, 156.
Alien, 87, 92, 109, 123, 154; arrested for netting song birds, 69; the, violator and education, 157.
  Gun law, 109, 123.
Allen, W. E., California wild life, 68.
Alligator, 106.
American Bison Society, 11, 12, 14.
American Game Protective Association, 69 113, 175.
  Bulletin, 69, 158, 161.
American Ornithologists' Union, 29.
Amphibian, 107.
Anchovy, 38, 80, 126, 178.
Anderson, George H., 24.
Angler, 10, 24, 55, 60, 111, 112, 121, 156. 166, 168, 169, 175.
Angling, 28, 54, 72, 168; the future of, in the San Joaquin, 112.
Animal, 18, 30, 32, 34, 35, 36, 40, 41, 46, 61. 69, 99, 101, 107, 109, 110, 114, 120, 129, 130, 132, 133, 134, 157, 168; California's large game, 11-15; 49-50; water company destroys predatory, 111.
  Aquatic, 106.
  Fur-bearing, 27, 33, 113, 120, 123, 157.
  Game, 33, 84, 86, 103, 120.
  Predatory, 30, 76, 86, 103, 123.
  Wild, 26, 131.
Antelope, 13, 49, 50, 75, 113, 114, 123; the future of the, 69.
Anthony, A. W., 59; a defense of the coyote, 111.
Antler, 110.
Aquarium, 108; the Steinhart, 106.
Arrest, 43, 66, 182.
Auk, The, 113.
Avocet, 36.

B

Bag limit, *see* limit.
Bailey, Vernon, 34.
Bait, 54, 66, 131.
Baldwin, S. P., 29.
Balistes polylepis, 75;
Banding, *see* bird.
Barnett, John J., 154-156.
Barracuda, 37, 38, 52, 75, 80, 87, 88, 89, 91, 92, 93, 94, 95, 96, 97, 98, 115, 126, 159, 170, 178.
Bass, 75, 165, 166.
  Black, 52, 66, 112, 157, 166.
    Sea, 38, 80, 115, 126, 178.
  Rock, 38, 80, 93, 126, 178.
  Striped, 39, 52, 54, 75, 81, 121, 127, 168, 169, 179; in Oakland lake, 110.
  White sea, 37, 38, 80, 87, 88, 89, 91, 92, 93, 94, 95, 115, 126, 178.
Bean, Hon. O. E., 25, 26.
Bear, 49, 63, 113, 133; tracks of, in sand, 58; a sheep-killing, 151-152.
  Black, 49, 53, 54, 120, 131; the, in relation to stock, 16-18; many defend, 59; woolgrowers would blacklist, 65.
  Brown, 120, 131.
  Grizzly, 49, 65.
  Kodiak, 120.
Beattie, Dr. B. A., 47.
Beaver, 39, 114; farming promising if properly controlled, 34-35.
Belding, Lyman, 113.
Biennial Report, 1922, 25, 60.
Bird, 15, 25, 27, 34, 35, 37, 56, 67, 99, 100, 101, 102, 108, 113, 115, 116, 118, 120, 161, 164, 168, 173; court decides mourning dove a migratory, 34; migratory, law enforcement, 35; the body temperature of, 35-36; protection in Italy, 42; aliens arrested for netting song, 69; trees and, 119; taking, censuses, 120; favorite lake for, saved to Minnesota, 175.
  Banding, 29, 117, 118.
  Game, 42, 59, 61, 75, 76, 85, 101, 111, 157, 158, 159, 161, 174, 175.
  Insectivorous, 71, 108, 157, 175.
  Migratory, 26, 123.
    Treaty Act, 34, 51, 101, 102, 162.
  Nongame, 66, 101, 159.
  Predatory, 51.
  Shore, 36, 159.
  Song, 119, 154, 157.
  Water, 33, 173, 175.
Bird Lore, 108.
Bird Notes and News, 42, 115.
Bison, 12, 13.
Bittern, 71.
Blair, Dr. J. E., 160.
Bluefish, 38, 80, 126, 178.
Bobcat, 16, 48, 76; *see* wildcat.
Boccaccio, 38, 80, 126, 178.
Bonito, 38, 80, 115, 126, 178.
Bosqui, E. L., 24.
Bounty, 25, 51, 52, 53, 70; law in Pennsylvania, 69; hawk and owl, 108; Michigan and the, system, 123.
Brown, J. G., 10.
Bruce, Jay, 65, 159; the black bear in relation to stock, 16-18.
Bryant, H. C., 21, 36, 63, 64, 67, 125, 160; salmon fishcultural operations on the Klamath River, 19-23; the body temperature of birds, 35-36.
Budget recommendations, 55-56.
Buck, 29, 32, 62, 63, 110, 155, 169; Vermont now has, law, 174; Spike, 66.
Buffalo, 11, 12, 13, 14, 69.
Burke, Jack, 69.
Burkey, H. T., 165.
Burning, over waste lands a menace to wildfowl, 71.
Burrow, 131.
Buteo swainsoni, 125.

C

"Cabrilla pinta," 75.
California Academy of Sciences, 11, 15, 49, 106, 107, 108.
CALIFORNIA FISH AND GAME, 2, 46, 55, 59, 60, 65, 68, 89, 108, 134, 138, 170.
California-Oregon Power Company, 20.
Canner, 62, 92, 96, 170.
Cannery, 5, 74, 115, 156, 172.
Cannerymen, albacore fishery worries, 156.
Caranx trachusus, 90.
Carp, 38, 80, 112, 126, 178.
Carrion, 131.
Cat, 111.
Catalina Islander, 159.
Catch, 40, 92, 96, 97, 98, 111, 160, 164.
Catfish, 38, 52, 80, 126, 178.
Census 123; taking bird, 120.
Centropomus pediamacula, 75.
Cervidae, 15.
Chelonia agassizi, 115.
Chilipepper, 38, 80, 126, 178.
Cheney, A. S., 19, 20.
Civet cat, 111.

Clam, 173.
Cockle, 39, 81, 127, 179.
Pismo, 39, 81, 118, 127, 179.
Softshell, 39, 81, 127, 179.
Clark, Frances N., 40.
Clark, M. S., 69.
Clark, G. A., 162.
Claw, 132.
Club, Hill and Mountain, 70.
Cod, 40, 50, 74, 96.
Cultus, 38, 80, 126, 178.
Rock, 93.
Coeca, 138, 142, 144, 145, 146, 147, 149, 150.
Coleman, R. A., 114.
Commercial Fishery Department, 25, 87, 106, 118.
Commission, *see* Fish and Game Commission.
Commissioner, 53, 57, 66, 174; a new, 24; western association of fish and game, meets at Sacramento, 25.
Of Fisheries, 104, 115.
Conditions, encouraging, prevail in Alaska in 1922, 120.
Confiscation, 37, 66.
Conlan, Jack, 46, 47.
Conservation, 2, 14, 25, 29, 31, 42, 51, 55, 56, 59, 72, 75, 83, 85, 88, 95, 96, 97, 110, 120, 161, 170; education fundamental in, 61-72; deer, 63-64; New Jersey organizes, League, 75; the most needed thing in game, 103-104; sentiment is growing, 157; in other states, 41-42; 75-76; 123-124; 174-176.
Deer, 29.
Fish and game, 24, 61, 154, 169.
Forest, 33.
Game, 159, 174.
Natural resources, 28, 42.
Wild life, 33, 56, 176.
Conservation News, 119.
Conservationist, 23, 57, 71, 123; who are the, 167-169.
Coot, 117, 175.
Cornetta, 75.
County cooperation, 66.
Court, impose heavy fines for illegal duck hunting, 71.
Courtright, George W., 32.
Conviction, 25, 35, 43, 66, 110.
Cooke, R. F., save the Klamath salmon and trout, 156-157.
Coon, *see* raccoon.
Coyote, 18, 30, 32, 48, 53, 76, 111, 120, 130, 131, 152; a defense of the, 111-112.
Crab, 39, 52, 81, 127, 179.
Horseshoe, 106.
Crawfish, 115.
Crow, 108; the, and game, 159.
Crustacean, 28, 39, 81, 127, 179.
Cuckoo, 36.
Culver, A. E., 73, 165, 166, 167, 168.
Cuttlefish, 39, 81, 127, 179.

D

Dahl, Knut, 3.
Dam, 25, 35, 54, 104, 105, 112, 157, 164, 175.
Copco, 20.
Electro-Metals, 156.
Portland Railway, Light and Power Company, 104.
Davis, B., 58.
Deer, 16, 28, 29, 32, 43, 49, 52, 53, 63, 66, 86, 99, 110, 113, 114, 116, 131, 155, 169, 174; the open season on, 29; need further protection, 32; in relation crops, 60; conservation, 62-64; poachers fined, 76; Indians fined for killing, 76; die in Humboldt County, 114; depredations of, in New Jersey negligible, 174; Minnesota reports, depletion, 174.
Forked-horn, 53.
Mule, 29, 44, 121, 154, 164.
Den, 133.
Depletion, 97, 156, 164, 170; or fluctuation, 40-41; of northern halibut, 73; Connecticut board to investigate shad, 160-161; Minnesota reports deer, 174.
Deputy, 49, 57, 69, 118, 121, 164, 165.
Diatom, 173.
Diodon holacanthus, 75.
Disease, 116, 118, 122, 134.
Distribution, 23, 29, 41; fish, 1923, 167.
District, Fish and Game, Nos. 2, 2½, 3, 4 and 4¾, 52; Nos. 1½, 7A, 8 and 9, 54.
Dixon, Joseph, fine of $100 and six months in jail for stealing traps, 30.
Doe, 32, 66, 76, 110, 174.
Dog, 43, 47, 48, 53, 68, 110, 112, 133, 151.
Dolphin, 38, 80, 126, 178.
Dove, 66, 71, 119; mourning, a migratory bird, court decides, 34-35.
Dowell, Overton, Jr., Oregon introduces moose, 41.
Downing, Earle, 171; protection of salmon essential, 171; halibut in California, 173; water pollution, 173.
Duck, 24, 25, 30, 33, 37, 52, 56, 61, 66, 71, 86, 101, 114, 117, 159, 164, 173, 174; courts impose heavy fines for illegal, hunting, 71; the migration of, 117-118.
Baldpate, 29.
Black, 29.
Gadwall, 117.
Lesser Scaup, 175.
Mallard, 29, 117, 175.
Merganser, 25.
Pintail, 29, 117.
Redhead, 117, 118, 175.
Ruddy, 175.
Shoveller, 117.
Spoonbill, 117.
Teal, Blue-winged, 29, 175.
Cinnamon, 117.
Green-winged, 117.
Wood, 71; hunting prohibited, 162-163.
Duke, R. D., 103.

E

Eagle, 120.
Bald, 108.
Earnshaw, Frank L., 34.
Echevisse, 39, 81, 127, 179.
EDITORIALS:
A new commissioner, 24; 1922 Biennial Report, 25; western association of fish and game commissioners meets at Sacramento, 25-27; proposed legislation, 27-28; fish food needed in mountain lakes 28; summer resort educational work a success, 28; bird banding, 29; the open season on deer, 29; new educational films, 30; fine of $100 and six months in jail for stealing traps, 30; whales disappearing along California coast, 31; many whales commercially extinct, 31; further tests in use of galvanized vessels in shipping fishes, 31; forest fires affect fish life, 31-32; the wild pheasants of Central California, 32; mule deer need further protection, 32; Oregon sportsmen protest, 32-33; Roosevelt wild life station, 33; Santa Barbara to frame protective laws, 33; fox farm to be established near San Bernardino, 33; game law changes in other states, 33-34; mourning dove a migratory bird, court decides, 34; beaver farming promising if properly controlled, 34-35; life sentence for murder of federal game warden, 35; migratory bird law enforcement, 35; toads of some use in curbing certain insect pests, 35; the body temperature of birds, 35-36; budget recommendations, 55-56; Congress kills Game Refuge-

Public Shooting Grounds bill, 56; hiding behind the farmer, 56-57; violations of pigeon law numerous, 57-59; many defend black bear, 59; California forest fire kills trout, 59; pheasants liberated in San Diego County, 59; quinnat salmon taken in Lake Ontario, 59-60; stricter laws necessary, 60; deer in relation to crops, 60; educational work, 60-61; "let well enough alone," is motto that applies especially to the California Fish and Game Commission, 62; deer conservation, 62-64; nonsale of trout, 64; Japan introduces rainbow trout, 64; woolgrowers would blacklist the black bear, 65; undersized trout, 65-66; County cooperation, 66; river patrol service, 66; pollution of coastal waters, 66; what do trout eat?, 67; California wild life, 68; under fire, 68-69; aliens arrested for netting song birds, 69; the future of the antelope, 69; many quail imported from Mexico, 69; bounty law in Pennsylvania, 69-70; Hill and Mountain Club; 70; Yukon salmon mature at later age than Sacramento salmon, 70-71; courts impose heavy fines for illegal duck hunting, 71; burning over waste lands a menace to wildfowl, 71; the most needed thing in game conservation, 103-104; Bureau of Fisheries supports Commission's stand on Klamath power project, 104-105; in memoriam—Willard Odion Fassett, 105-106; the Steinhart aquarium, 106-108; it all helps, 108; hawk and owl bounties, 108; game law abstracts, 109; rabbit hunting and quail, 109; striped bass in Oakland lake, 110; do not molest fawns, 110; a warning, 111; water company destroys predatory animals, 111; a defense of the coyote, 111-112; the future of angling in the San Joaquin, 112-113; resolutions, 113; Canada's introduced partridges, 113; early game conditions in the great valleys, 113; deer die in Humboldt County, 114; shark meat sold as "white bass," 114; growing activity of California fishermen along Mexican coast, 114-115; United States leads in game refuges, 115-116; conditions in refuge ID, 116; pelagic sealing prohibited, 116-117; the migration of ducks, 117-118; scientific work of the Commission appreciated, 118-119; Louisiana's superlatives, 119; number of hunters increasing in United States. How about the game supply?, 119; trees and birds, 119; changes in Federal game laws, 120; taking bird censuses, 120; encouraging conditions prevail in Alaska in 1922, 120; State Fair exhibit, 154; Public Shooting Grounds-Game Refuge Bill, 154; in memoriam—John J. Barnett, 154-156; court orders old screens installed, 156; save the Klamath salmon and trout, 156-157; the alien violator and education, 157; conservation sentiment is growing, 157; California asked to introduce the American Woodcock, 158-159; Oregon has new commission, 159; the crow and game, 159; jail sentence for violator, 159-160; game laws for plants, 160; Connecticut board to investigate shad depletion, 160-161; will attempt domestication of wild turkey, 161; the nation's game supply, 161; conserving the fur supply, 161-162; wood duck hunting prohibited, 162-163; human carelessness exacts heavy forest fire toll, 163; signs and simpletons, 163.
Education, fundamental in conservation, 61-62; Michigan institutes campaign of, 124; the alien violator and education, 157.
Educational work, 25, 60, 121; summer resort, a success, 28.
Eel, 38, 80, 126, 178.
Egg, 1, 3, 19, 20, 25, 33, 67, 98, 116, 122, 125, 159, 160; large take of trout, obtained in Fish Lake, Utah, 42; breeding ponds yield large number of, 122; eastern brook trout, imported, 122; notes on the, yield of Sacramento River king salmon, 134-138.
  Salmon, 19, 20, 22, 27, 28, 30, 54, 67, 103, 104, 153.
  Trout, 19, 37, 64, 156; eggs to be imported, 165; hatched in gravel, 166-167;
    Brown, 122.
    Eastern brook, 25, 42, 122, 165.
    Loch Leven, 122, 165.
    Rainbow, 42.
    Sea-run, 103.
    Steelhead, 122.
Electro-Metals Company, 103, 104, 156.
Elk, 13, 49, 50, 86, 113, 114; open season on, demanded in Washington, 41.
  American, 15.
  California valley, 15, 49.
  Mountain, 15.
  Roosevelt, 15.
  Tule, 49.
Embryo, 25.
Ephinephalus analogus, 75.
Esposito, Louis, 35.
Euthynnus alleterata, 74.
Euthynnus pelamis, 74.
Evermann, Dr. B. W., 31, 107.
Exhibit, State Fair, 154.
Expenditure, statement of, 44, 79, 177.
Experiment, 34, 64, 67, 160;
  Salmon marking, 25, 37.
Extermination, 65, 101, 104.

F

Facts of Current Interest 37, 72, 121, 164.
Farmer, hiding behind the, 56.
Fassett, W. O., in memoriam, 105.
Fauna, 28, 115, 124, 134, 176.
Fawn, 32, 76, 174; do not molest, 110.
Fee, license, 26, 55, 175; increased, 175.
Felis oregonensis, 45.
Fertilizer, 170.
Field and Stream, 158.
Film, 154; new educational, 30.
Fin, 2, 74;
  Adipose, 1.
  Ventral, 1.
Fins, Feathers and Fur, 113.
Fine, 25, 34, 58, 59, 66, 71, 76, 174; of $100 and six months in jail for stealing traps, 30; courts impose heavy, for illegal duck hunting, 71.
Fingerling, 4, 22, 166, 167.
  Salmon, 70, 71.
  Trout, 167.
  Whitefish, 31.
Fire, California forest, kills trout, 59.
Firearm, 33.
Fish, 1, 2, 3, 4, 5, 6, 10, 11, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 37, 38, 40, 41, 42, 50, 51, 52, 53, 54, 56, 59, 62, 63, 65, 67, 68, 70, 73, 74, 77, 78, 85, 87, 88, 89, 90, 91, 94, 95, 96, 97, 98, 103, 104, 109, 112, 113, 114, 115, 119, 135, 136, 137, 154, 155, 156, 157, 159, 160, 161, 163, 164, 165, 166, 168, 170, 171, 172, 173; further tests in use of galvanized vessels in shipping, 31; forest fires affect, life, 31-32; pending, and game legislation, 51-54; the use of, as fertilizer, 74; Mexican, in

Californian markets, 74-75; a possible separation of the river races in ocean, caught by means of anatomical characters, 138-150; electric fish stop does not stop, 165-166; planted by the commission furnish sport in national parks, 166; distribution, 1923, 167.
Food, 31, 42, 106, 154, 157.
Game, 25, 31, 60, 106, 157.
Marine, 73.
Meal, 170.
Pond-reared, 4.
Predatory, 22.
Tropical, 107.
Fish and Game Commission—
California, 11, 16, 19, 22, 24, 25, 26, 27, 28, 29, 31, 43, 44, 50, 53, 55, 56, 57, 61, 63, 69, 72, 76, 79, 87, 94, 103, 104, 105, 106, 109, 110, 112, 121, 154, 156, 157, 160, 161, 164, 167, 168, 169, 170, 172, 173; "let well enough alone," is motto that applies especially to the, 62; Bureau of Fisheries supports, stand on Klamath power project, 104; scientific work of the, appreciated, 118.
Connecticut, 160.
Idaho reorganizes, 124.
Louisiana, 119.
Massachusetts, 165.
Michigan, 124.
Minnesota, 113, 174, 175.
New Jersey, 66, 122, 165, 174.
Oregon has new, 159.
Pennsylvania, 69.
Texas, 123.
Utah, 42, 117.
Vermont, 62, 174.
West Virginia, 174, 175.
Wisconsin, 65.
Wyoming, 174.
Fish and Game Protective Association, 55, 72, 75.
Alberta, 113.
American, 69, 113, 175.
California Fish, Game and Forest Protective League, 169.
Nevada State, 75.
North Carolina, 123.
San Diego, 59.
Fish stop, electric, does not stop fish, 165-166.
Fishcultural department, 25, 104, 106, 122.
Fishculture, 1, 25, 106, 166; salmon, operations on the Klamath River, 19-23.
Fishculturist, 105, 167.
Fisher, A. K., 113.
Fisherman, 2, 24, 29, 55, 62, 64, 68, 85, 86, 87, 91, 96, 97, 98, 121, 156, 160, 169, 171; growing activity of California, a'org Mexican coast, 114; sardine, strike at Monterey, and settlement, 172-173.
Fishery, 25, 34, 40, 41, 50, 62, 66, 73, 106, 118, 119, 169, 170; southwestern Alaska, reservation, 41; review of Dr. Skogsberg's report on the purse seine, of California, 87-98; albacore, worries cannerymen, 156.
Barracuda, 96.
Commercial, 54, 170.
Note, 168-173.
Cod, 50.
Halibut, 96.
Herring, 50, 90.
Product, California fresh fishery, 38-39; 80-81; 126-127.
Salmon, 68.
Sardine, 50, 171.
Tuna, Bluefin, 97.
Whale, 31.
White sea bass, 97.
Ye'lowtail, 97.
Fishing, 6, 11, 16, 26, 50, 52, 55, 59, 60, 66, 68, 69, 74, 90, 97, 98, 112, 113, 116, 121, 124, 156, 166, 169, 170, 171, 172.
Commercial, 121, 168.
Night, 54.
Fishway, 20, 25, 54, 73, 104, 105; a salmon's lament at the Estacada, 153.
Fistularia depressa, 75.
Fleming, J. H., why Canada and the United States combined to stop spring shooting, 101-102.
Flicker, 71.
Flintham, Stuart, A., 66.
Flora, 28, 124.
Flounder, 37, 38, 74, 80, 126, 173, 178.
Fluctuation, 156, 170; depletion or, 40-41.
Flycatcher, 36.
Follett, Chas., the wild pheasants of Central California, 32.
Food, 6, 14, 17, 25, 32, 60, 134; fish, needed in mountain lakes, 28.
Of band-tailed pigeon, 57, 99.
Of bear, 18.
Of fish, 20, 25, 67.
Of Swainson hawk, 125.
Of wolverine, 131, 133.
Forest, rangers war on, outlaws, 76; *see* National Forest; *see* United States Forest Service.
Fire, 29, 124; affect fish life, 31-32; California, kills trout, 59; human carelessness exacts heavy, toll, 163.
Forest and Stream, 161.
Fowl, 159.
Fox, 111, 120, 133, 174; farm to be established near San Bernardino, 33;
Gray, 48, 53, 70.
Red, 70.
Silver, 161.
Frog, 39, 81, 127, 179.
Fry, 1, 22, 25, 42, 161, 166, 167.
Salmon, 22, 25, 70, 150.
Smelt, 28.
Trout, 25, 28, 167.
Whitefish, 31.
Fry, Walter, the wolverine, 129-134.
Fryman, G. W., 58.
Fur, 18, 34, 35, 113, 130, 174; conserving the, supply, 161-163.
Fur-bearer, 34, 113, 120.

G

Gallinule, 71.
Florida, 175.
Game, 16, 18, 24, 25, 26, 27, 28, 33, 34, 44, 51, 53, 56, 63, 77, 78, 83, 84, 85, 86, 104, 108, 111, 113, 119, 120, 121, 123, 155, 156, 157, 161, 163; Ca'ifornia's large, animals, 11-15; 49-50; law changes in other states, 33-34; Nebraska enumerates extinct, 42; pending fish and, legislation, 51-54; forest officers arrest many, violators, 76; refuges and game management on the national forests, 83-86; the most needed thi g in, conservation, 103; early conditions in the great valleys, 113-114; number of hunters increasing in United States, how about the, supply?, 119; North Carolina votes down new, bill, 123; New Mexico's new, code, 123-124; the crow and, 159; laws for plants, 160; the nation's supply, 161; new, preserves for Louisiana, 174; Nevada establishes, 175.
Gear, 95, 96, 97.
Gilbert, C. H., 3, 70, 138.
Gill raker, 138, 147, 148, 149, 150.
Glutton, 131.
Goat, 17.
Godwit, 71.
Go'dman, E. A., 24.
Goose, 30, 37, 52, 56, 101, 114.
Canada, 158, 160.
Gopher, 131.
Goshawk, 108.
Grayfish, 38, 80, 126, 178.
Greenfish, 38, 80, 126, 178.
Griffin, Judge Ray, 69.
Grebe, 25, 71, 175.

Grilse, 2.
Gull, 71.
  Laughing, 159.
Ground hog, 132.
Grouse, 28, 120.
Gulo luscus, 129.

H

Haddock, 96.
Hake, 38, 80, 126, 178.
Halibut, 38, 73, 80, 88, 93, 115, 126, 169, 178; in California, 173.
Hardhead, 38, 80, 126, 178.
Hare, Arctic, 120.
Hatchery, 1, 19, 20, 23, 25, 27, 55, 61, 65, 66, 105, 106, 124, 137, 161, 164, 167; Oregon adopts policy of numerous small, 142; notes, 122; 165-167;
  Baird, 19.
  Battle Creek, 137.
  Feather River, 132.
  Fall Creek, 1, 20, 22, 103, 150.
  Fort Seward, 22, 106.
  Klamathon, 19, 20.
  Kaweah, 122.
  Mill Creek, 19.
  Mt. Shasta, 21, 22, 25, 37, 63, 64, 67, 122.
  Price Creek, 105, 106.
  Sisson, 105, 122.
  Ukiah, 106.
  Wawona, 122.
Hawk, 69, 120; and owl bounties, 108; remarkable flight, of, 125.
  Cooper's, 108.
  Goshawk, 108.
  Sharp-shinned, 108.
  Swainson, 125.
Hearing, Klamath River power project, 103.
Heath hen, Arizona society interested in preserving, 122.
Hedderley, E. L., in memoriam—John J. Barnett, 154-156.
Hellbender, 107.
Heron, 118.
  Great blue, 25, 117.
  Green, 159.
  Night, 71.
    Black-crowned, 175.
  Snowy, 117, 118.
Herring, 38, 40, 50, 74, 80, 126, 170, 178.
  "Fat," 50.
  River, 165.
  "Spring," 50.
Hide, 66.
Higgins, Elmer, sardines abundant now—but what of the future?, 50-51; review of Dr. Skogsberg's report on the purse seine fisheries of California, 87.
Higgins, Dr. J. T., 46, 47.
Hill, J. H., 118.
Hobbs, R. N., 58.
Hogg, John Edwin, 58, 61, 65, 156; deer conservation, 62-64.
Hogg, Mrs. John Edwin, 65, 158.
Horn, 110, 114.
Hornaday, Dr. W. T., 13.
"Horse mackerel," 90.
Horsehead, 75.
Hunt, E. W., 105.
Hunt, 12, 13, 16, 32, 56, 63.
Hunter, 12, 13, 24, 25, 28, 29, 30, 32, 33, 41, 43, 51, 55, 56, 62, 63, 85, 86, 111, 121, 154, 155, 161; number of, increasing in the United States. How about the game supply?, 119.
  Alien, 25.
Hunting, 12, 16, 17, 33, 35, 51, 53, 54, 55, 58, 60, 61, 63, 66, 69, 71, 84, 111, 116, 124, 130, 162, 163, 164; courts impose heavy fines for illegal duck, 71; rabbit, and quail, 109; wood duck, prohibited, 162-163.
  Night, 123.
Hunting accident, 154; reduced in Wyoming, 174.

I

Ibis, White-faced Glossy, 117, 118.
Ichthyologist, 10.
Income, statement of, 79, 176.
Insect, 11, 25, 28.
Investigation, 50, 72, 73, 89, 106, 156, 159, 160, 165, 170; the purse seine, 73.
  Fisheries, 25.
  Sardine, 51.

J

Jackrabbit, 111.
Jakways, Hon. Chas. A., 25, 27.
Jewett, Stanley, G., ospreys in Modoc County, California, 125.
Japan, introduces rainbow trout, 64.
Jones, Hon. O. M., 25, 26.
Jordan, John Jr., 76.

K

Kennedy, Isola, 46, 47.
Kingfish, 38, 80, 126, 178.
Knot, 71.
Kofoid, Dr. C. A., 40.
Kooskia (Idaho) Mountaineer, 59.

L

Laboratory, State Fisheries, 25, 50, 75, 87; the, staff, 40; the moving of the, 73-74; contribution No. 38, 50; *see* Note.
Ladder, fish, *see* fishway.
  Folsom, 73.
Lair, 133.
Lane, Curtis, 46.
Law, 25, 26, 27, 30, 32, 34, 49, 54, 62, 63, 64, 66, 69, 70, 75, 78, 83, 85, 110, 111, 113, 115, 116, 120, 121, 176; Santa Barbara to frame protective, 33; game, changes in other states, 33; migratory bird, enforcement, 35; violations of pigeon law numerous, 57-59; stricter, necessary, 60; bounty, in Pennsylvania, 69; changes in Federal game, 119-120; game, for plants, 160; Vermont now has buck, 174.
  Alien gun, 109, 123.
  Bird, 123.
  Bounty, 108.
  Conservation, 169.
  Enforcement, 61, 68, 69, 154.
  Federal, 35.
  Fishway, 54, 104.
  Fish and game, 27, 30, 51, 52, 53, 66, 174.
  Game, 42, 123, 157, 162.
    Abstracts, 109.
  Limit, 109.
Nonsale, 24.
Laws, G. O., conditions in refuge 1D, 116.
Lawyer, Geo. A., 25, 26, 34.
Lecture, 28.
Lee, Judge, 76.
Legislation, 26, 33, 75, 101, 113, 171; proposed, 27-28; pending fish and game, 51-54; 169-170.
"Let well enough alone," is motto that applies especially to the California Fish and Game Commission, 62.
Library, the, 40.
License, 26, 41, 51, 53, 55, 62, 66, 69, 72, 79; increased, fees, 175.
  Angling, 25, 53.
  Fishing, 53, 55, 119.
  Hunting, 25, 27, 33, 53, 55, 120, 157.
  Nonresident, 32.
  Special, 33.
Life history, 22, 23, 33, 40, 73; Notes, 125.
Limit, 53, 57, 66, 75.
  Bag, 28, 29, 32, 43, 44, 51, 63, 113.
  Black bass, 52.
  Buck, 52.
  Trout, 111.
Limpet, 39, 81, 127, 179.

Lindgren, Edgar, 35.
Lion, Mountain, 16, 17, 18, 25, 47, 52, 53, 56, 76, 86, 130, 131, 133, 152; rabies in a, 45-48.
State, hunter, 16, 56, 65, 72.
Lioness, 17, 46.
Lobster, 25, 37.
Spiny, 37, 39, 52, 81, 115, 127, 179.
Locke, S. B., 67; game refugees and game management on the national forests, 83-86.
"Long gun," 53.
Lorenzen, L. N., a sheep-killing bear, 151-152.
Ludlum, Roy, do not molest fawns, 110.
Luttrell, Judge, C. J., 156.
Lynx, 133.

M

Mackerel, 38, 74, 80, 88, 91, 113, 115, 126, 170, 178. *See* "horse mackerel."
Madsen, D. H., 25.
Mammal, 11, 15, 31, 42, 49, 75.
Fur-bearing, 111, 113.
Predatory, 51.
Mammoth, 134.
Map, of northern California coast, showing mouth of Klamath River and salmon fishing grounds, 6.
Marlin, 38, 80, 126, 178.
Marmot, Yellow-bellied, 131.
Mastodon, 134.
Mather, Stephen T., 61.
McAllister, M. Hall, California's large game animals, 11-15; 49-50; the band-tailed pigeon in Yosemite, 99-100.
McGregor, E. A., 2; notes on the egg yield of Sacramento River king salmon, 134-138; a possible separation of the river races of king salmon in ocean-caught fish by means of anatomical characters, 138-150; a salmon's lament at the Estacada fishway, 153.
Meat, 49, 62, 66, 74, 76, 85.
Buffalo, 13, 11.
Deer, 25.
Goat, 17, 18.
Reindeer, 14.
Menhaden, 170.
Merganser, 25.
Merkle, Henry, 46.
Migration, 12, 23, 29, 71, 75, 93, 101, 134, 160; the, of ducks, 117-118.
Migratory Bird Treaty Act, 34, 71, 101, 102, 113.
Miller, J. O., 121.
Mink, 70.
Minnow, 112.
Mollusk, 39, 81, 127, 179.
Moose, 120; Oregon introduces, 41.
Morris, Judge, L. J., 58, 59.

N

National forest, 29, 76, 86, 163; summer homes popular in, 76; game refuges and game management on the, 83-86.
Angeles, 43, 76, 163.
California, 76, 163.
Cleveland, 76.
El Dorado, 76.
Santa Barbara, 59, 76, 163.
Sequoia, 76.
Sierra, 76.
Stanislaus, 76.
National game conference, 113.
National Park, 60; fish planted by the commission furnish sport in, 166.
General Grant, 166.
Glacier, 28.
Sequoia, 28, 49, 129, 130, 131, 132, 133, 166.
Yellowstone, 14, 27, 28, 33.
Yosemite, 28, 54, 61, 99, 121, 166.
National Park Service, 15, 25, 28, 130, 166.
Natural history, 106.
Naturalist, 33, 41, 45.
Nature guide, 28.
Service, 28, 129.
Nelson, E. W., 161.
Nest, 71, 100, 125, 159, 160.
Nestling, 118.
Net, 52, 54, 66, 69, 97, 98, 121, 157.
Dip, 90.
Drag, 52, 169, 170.
Fyke, 154.
Gill, 97, 153, 170.
Lampara, 52, 170; the, 171.
Round haul, 52, 170.
Paranzella, 171.
Purse, 52; review of Dr. Skogsberg's report on the, seine fisheries, of California, 87-98.
Nevada, wakes up, 75.
Newbert, Frank, M., 17, 25, 26, 27.
New Jersey Outdoorsman, 66, 75.
Nidever, Captain H. B., 160.
Nonsale, of trout, 64.
Note, Commercial fishery, 168-173.
Hatchery, 122; 165-168.
Life History, 125.
State Fisheries Laboratory, 40-41; 73-75.

O

Obee, E. H., 49.
O'Malley, Henry, 70, 104, 105.
Opossum, 111.
Osprey, in Modoc County, California, 125.
Otter, 113, 114.
Sea, 116.
Ova, 134, 135, 136, 137, 138, 139, 140, 141, 149, 150.
Overfishing, 40, 51, 73, 74, 96, 97, 170, 173.
Owl, 69; hawk and, bounties, 108.
Horned, 108.
Snowy, 108.
Oyster, 119.
Eastern, 39, 81, 127, 179.
Native, 39, 81, 127, 179.

P

Pandion haliactus carolinensis, 125.
Partridge, Canada's introduced, 113.
Hungarian, 113, 158; Montana introduces, 75-76.
Parvin, R. G., 25.
Patrol, 175; river, active, 66.
Pearl, "blister," 115.
Pelage, 130.
Pelican, 25.
Pelt, 35.
Perch, 38, 75, 80, 126, 178.
Permit, 54, 103, 115, 120.
Phalarope, 36.
Pheasant, 175; the wild, of Central California, 32.
Chinese, 32, 33, 157; liberated in San Diego County, 59.
Ring-necked, 33.
Pigeon, 36; violations of law numerous, 57-59.
Band-tailed, 57; the, in Yosemite, 99.
Passenger, 99.
Wild, 66, 99.
Pike, 38, 72, 80, 126, 165, 178.
Pilchard, 90.
Plankton, 173.
Platee, 96.
Plover, 114.
Poacher, 12, 123; deer, fined, 76.
Poem, 153.
Pollution, 113, 157, 173; of coastal waters, 66; water, 173.
Pompano, 38, 80, 126, 178.
Pond, 1, 21, 22, 25, 35, 37, 42, 65.
Breeding, 3; yield large number of eggs, 122.

Poole, Charles G., 30, 32.
Porcupine, 129, 130.
Porcupine fish, 75.
Porpoise, 107.
Prairie chicken, 76.
Power, Klamath River, project hearing, 103-104; Bureau of Fisheries supports Commission's stand on Klamath, project, 104-105.
Predatory, *see* animal, bird, fish.
Preservation, 11, 55, 73, 116.
Preserve, 41.
  Game, 51, 52, 83, 108, 175, 176; new, for Louisiana, 174.
  Grand Canyon National Game, 27.
  Hunting, 51.
Prey, 130.
Propagation, fish, 3, 24, 25, 62, 64, 104, 160, 166.
  Game, 15, 34, 62.
  Waterfowl, 34.
Protection, 24, 31, 32, 34, 41, 52, 54, 56, 62, 65, 68, 69, 75, 84, 85, 86, 99, 101, 102, 109, 110, 114, 116, 123, 152, 157, 164, 169; mule deer need further, 32; of salmon essential, 171.
Protectionist, France entertains, 176.
Ptarmigan, 120.
Public Shooting Ground-Game Refuge Bill, 25, 26; Congress kills, 56; 154.

Q

Quail, 25, 32, 33, 52, 66, 67, 113, 116, 175; many, imported from Mexico, 69; rabbit hunting and, 109.
  California, 158.
  Mountain, 28, 52, 114.
  Valley, 109, 111.

R

Rabbit, 111, 112, 120; hunting and quail, 109; New Jersey to introduce, 174;
  Cottontail, 32.
  Jackrabbit, 111.
Rabies, in a mountain lion, 45-48.
Raccoon, 53, 111.
Rack, 1, 2, 4, 20, 21.
Rail, Clapper, 159.
  Sora, 175.
Ralph, Charles, 17.
Ranger, 131, 133; war on forest outlaws, 76.
Rat, 131.
Redington, Paul, G., U. S. Forest Service Cooperation, 43-44; 76.
Refuge, 33, 157; West Virginia establishes, 175.
  Bird, 26, 33, 83, 85.
  Game, 11, 15, 25, 26, 32, 34, 42, 69, 72, 116, 124; 174; Congress kills, Public Shooting Grounds Bill, 56; and game management on the National forests, 83, 86; United States leads in, 115; conditions in, 1D, 116; Nevada establishes, 175; King's Peak, 52.
Reindeer, 14.
Report, 26, 44; 77-79, 176-182; a second, on the return of king salmon marked in 1919 in Klamath River, 1-6; Forest Service submits supplementary game, 43; review of Dr. Skogsberg's, on the purse seine fisheries in California, 87-98.
  Biennial, *see* Biennial.
Reptile, 107.
Reservation, 69, 115, 125; Southwestern Alaska fisheries, 41.
  Clear Lake, 125.
Reserve, 25, 99, 101.
Resolution, 27, 113.
Resort, summer, educational work a success, 28.
Resource, 66, 68, 75, 86.
  Fish and Game, 62, 124, 157.
  Game, 25, 159.
  Natural, 28, 31, 42, 124.
  Wild life, 55, 103.
Review, of Dr. Skogsberg's report on the purse seine fisheries of California, 87-98.
Rich, W. H., 118.
Riley, Smith, 69.
Ripple, R. H., 167.
Robin, 71.
Rockfish, 38, 80, 88, 93, 126, 178.
Rock hind, 75.
Rook, 108.
Roosevelt Wild Life Station, 33.
Rowley, John, 15.
Rutter, Cloudsley, 22.

S

Sablefish, 38, 80, 126, 178.
Sage hen, 32.
Salamander, 107.
Salmon, 20, 25, 27, 30, 37, 38, 52, 54, 68, 80, 91, 103, 104, 107, 112, 113, 126, 164, 167, 168, 169, 178; fishcultural operations on the Klamath River, 19-23; a, lament at the Estacada fishway, 153; save the Klamath, and trout, 156-157; protection of, essential, 171.
  Chinook, 71, 150, 153.
  King, 21, 22, 25, 71, 156, 164; a second report on the return of, marked in 1919 on the Klamath River, 1-6; notes on the egg yield of Sacramento River, 134-138; a possible separation of the river races of, in ocean-caught fish, 138-150.
  Klamath, 3, 20.
  Land locked, 28, 63.
  Quinnat, taken in Lake Ontario, 59-60.
  Sacramento, 3, 20.
  Silver, 21.
  Sockeye, 64.
Sand dab, 38, 80, 126, 178.
San Joaquin Light and Power Company, 112.
Sanctuary, 34, 62, 115, 175.
San Diego Natural History Museum, 59.
Sandpiper, 71.
Sardine, 38, 53, 74, 80, 90, 91, 92, 98, 121, 126, 164, 170, 171, 178; abundant now—but what of the future?, 50-51; the, season at Monterey, 171-172; fishermen's strike at Monterey, and settlement, 172-173.
Scale, 2, 3, 4, 5, 7, 8, 9, 70.
Scientific Monthly, 31, 161.
Scientific work of the commission appreciated, 118-119.
Scofield, E. C., 2, 5.
Scofield, N. B., 68, 118, 119; commercial fishery notes, 168-173.
Scofield, W. L., 40; the sardine season at Monterey 171-172; sardine fishermen's strike at Monterey and settlement, 172-173.
Screen, 25, 165, 166, 167, 168; many, installed, 122; court orders, installed, 176.
Sculpin, 38, 80, 126, 178.
Sea lion, 106, 107.
Seal, 14.
  Fur, 107, 116.
  Leopard, 107.
Sealing, pelagic, prohibited, 116-117.
Season, 76, 104, 109, 114, 156, 157, 174.
  Breeding, 43.
  Canning, 171.
  Closed, 34, 44, 52, 63, 65, 71, 113, 168, 171.
  Deer, 29, 121, 164.
  Duck, 164.

Fishing, 172.
Hunting, 32, 43, 44, 85, 86.
Open, 29, 33, 34, 51, 52, 113; on elk in Washington, 41.
Rutting, 43.
Salmon, 164.
Sardine, 51; the, at Monterey, 171-172.
Spawning, 21, 93, 122.
Trapping, 30.
Trout, 121, 169.
Tuna, 115.
Seine, 153.
Purse, 170, 171; investigation, 73; review of Dr. Skogsberg's report on, fisheries of California, 87-98.
Selene vomer, 75.
Seizure, 77, 182.
Septicæmia, hemmorhagic, 114.
Set-line, 154.
Sette, O. E., 40.
Shad, 38, 52, 80, 126, 169, 178; Connecticut Board to investigate, depletion, 160-161.
Shark, meat sold as "white bass," 114.
Leopard, 114.
Shebley, W. H., 1, 104, 112; hatchery notes, 122, 165-168.
Sheep, 16, 17, 18, 48, 112; a, -killing bear, 151-152.
Bighorn, 63.
Mountain, 49, 50, 53, 63, 123, 169.
Sheepshead, 39, 81, 127, 179.
Shellfish, 25, 37, 54.
"Sheol curver," 107.
Sherwood, L., 69.
Simmons, Sylvester, 76.
Shooting, 13, 35, 51, 54, 61, 66, 76, 174; why Canada and the United States combined to stop spring, 101-102; Michigan hits, monopoly, 176.
Shooting ground, Congress kills Game Refuge-Public, Bill, 56.
Shotgun, 46, 53, 158.
Shrimp, 39, 52, 67, 81, 127, 179.
Skate, 39, 81, 127, 179.
Skipjack, 39, 81, 127, 179; the Hawaiian, in our waters, 74.
Skogsberg, Dr. Tage, 40, 73, 170; review of, report on the purse seine fisheries of California, 87-98.
Skunk, 48, 53, 111, 174.
Smalley, E. W., 165.
Smelt, 39, 81, 93, 127, 179.
Snapper, Alligator, 107.
Snail, 39, 81, 127, 175, 179.
Snyder, J. O., 23, 135, 138; a second report on the return of king salmon marked in 1919, in Klamath River, 1-6; the identification of trout, 10-11.
Sole, 39, 81, 127, 179.
Spawn, 96.
Spawning, 4, 6, 19, 20, 28, 50, 60, 67, 70, 93, 96, 97, 137, 153, 157, 169; the, season, 122.
Sphyraena ensis, 75.
Splittail, 39, 81, 127, 179.
Sport, 13, 24, 60, 159.
Sportsman, 12, 13, 24, 33, 43, 60, 61, 62, 66, 69, 70, 71, 72, 85, 86, 98, 101, 120, 155, 156, 168, 169, 170, 175; Oregon, protest, 32-33;
Spring shooting, why Canada and the United States combined to stop, 101-102.
Squid, 39, 81, 127, 179.
Squirrel, 111.
Flying, 99.
Ground, 48, 112.
Tree, 52.
Stanford Illustrated Review, 119.
Starks, Professor Edwin C., 31.
State Department of Agriculture, 30.
State fair exhibit, 154.
Station, 2.
Egg-collecting, 19, 20.
Battle Creek, 105, 137.
Bogus Creek, 22.
Branscomb, 106.
Camp Creek, 22.
Fall Creek, 22.
Klamathon, 20, 21, 103, 122.
Sacramento River, 19.
Snow Mountain, 106, 122.
Tahoe, 105.
U. S. Bureau of Fisheries, 19.
Roosevelt Wild Life, 33.
Whaling, Moss Landing, 31.
Steele, R. C., 125.
Steinhart, Igantz, 107; the, aquarium, 106-108.
Stephens, Governor Wm. D., 24.
Stingaree, 39, 81, 127, 179.
Stingray, 162.
Stock, the black bear in relation to, 16-18.
Stockton Record, 70.
Storer, Tracy I., rabies in a mountain lion, 45-48.
Sturgeon, 154.
Sucker, 39, 81, 125, 126, 165, 179.
Sunfish, 168.
Surf fish, 39, 81, 127, 179.
Swallow, Rough-winged, 36.
Swan, Whistling, 72.
Swordfish, 39, 81, 127, 179.

T

Tag, 53, 63.
Taylor, Dr. W. P., 57.
Tern, Black, 175.
Terrapin, 39, 81, 127, 179.
Test, further, in use of galvanized vessels in shipping fishes, 31.
Thomas, R. E., 124.
Thompson, Will F., 88, 119; notes from the State Fisheries Laboratory, 40-41; 73-75; review of Dr. Skogsberg's report on the purse seine fisheries of California, 87-98.
Thrush, 36, 71.
Toads of some use in curbing certain insect pests, 35.
Tomcod, 39, 81, 127, 179.
Track, 16, 130, 151.
Trail, 17, 34.
Trailing, 16.
Trap, 34, 35; fine of $100 and six months in jail for stealing, 30.
Trapper, 30, 32, 113, 131.
Trapping, 23, 30, 34, 70, 111, 130, 161.
Trapshooter, 24.
Trawl, Otter, 171.
Trolling, 169.
Treaty, *see* Act, Bird, and Migratory.
Trees and birds, 119.
Triakis semifasciatum, 114.
Trout, 3, 19, 20, 25, 32, 37, 52, 54, 107, 111, 112, 153, 154, 156, 169; the identification of, 10-11; California forest fire kills, 59; nonsale of, 64; undersized, 65-66; what do, eat?, 67; eggs to be imported, 165; attempts made to secure new, 165; eggs hatched in gravel, 166; what percentage of, reach maturity, 167.
Black-spotted, 122.
Brook, 31.
Brown, 164, 167; to be planted in Russian River, 122.
Cutthroat, 10, 167.
Eastern Brook, 10, 11, 65, 67, 154, 164, 166; eggs imported, 122.
Farm, 39, 81, 127, 179.
Golden, 10, 11, 154.
Klamath, 22; save the Klamath salmon and, 156-157.
Lake, 31, 167.
Loch Leven, 64, 164, 167.
Mackinaw, 67, 167; secured, 122.

Rainbow, 10, 11, 31, 64, 65, 67, 122, 164, 166, 167; Japan introduces, 64; steelhead and, taken in Tahoe, 122.
Sea, 38, 80, 126, 178.
Sea-run, 103, 104, 164.
Steelhead, 28, 38, 54, 64, 67, 81, 122, 127, 157, 167, 169, 179; and Rainbow taken in Tahoe, 122.
Sunapee, 165.
Tahoe, 10, 11, 64.
Trumpet fish, 75.
Tucson Natural History Society, 123.
Tuna, 39, 81, 91, 127, 179.
Bluefin, 39, 81, 89, 92, 93, 94, 95, 115, 127, 179.
Yellowfin, 39, 81, 115, 127, 179.
Turbot, 39, 81, 127, 179.
Turkey, Honduras Spotted, will attempt domestication of, 161.
Wild, 33.
Turnstone, 71.
Turtle, 39, 81, 106, 107, 115, 127, 179.

U

U. S. Bureau of Animal Industry, 69.
U. S. Department of Agriculture, 27, 34, 57, 71, 108, 117, 119, 120, 161, 162, 175.
U. S. Bureau of Bio'ogical Survey, 32, 34, 35, 57, 71, 86, 108, 118, 120, 157, 161, 162, 175.
U. S. Bureau of Fisheries, 19, 22, 31, 32, 42, 59, 67, 70, 114, 116, 118, 157, 166, 167; supports commission's stand on K'amath power project, 104-105.
U. S. Forest Service, 11, 25, 33, 67, 76, 83, 116; cooperation, 43-44; 76.
U. S. National Museum, 13, 50.
Ursus americanus, 16.

V

Van Camp Sea Food Corporation, 74.
Venison, 33, 62, 63.
Vermin, 70.
Vertebra, 150.
Vieuda, 75.
Violation, 25, 26, 35, 43, 63, 71, 72, 75, 76, 78, 85, 157, 180-181; of pigeon law numerous, 57.
Violator, 62, 66, 75, 154; forest officers arrest many game, 76; mostly foreigners, 109; the alien, and education, 157; jail sentence for, 159-160.

W

Walrus, 14.
Warden, 2, 26, 32, 43, 49, 57, 66, 124, 155.
Federal, 26; life sentence for murder of, 35.
United States Game, 25, 26, 34, 35.
Warning, a, 111.
Warren, B. H., 159.
Water-dog, 107.
Waterfowl, 29, 30, 33, 34, 37, 113, 115, 119, 157, 174; New Mexico provides resting areas for, 174.
Water snake, 107.
Watt, Dr. F. W., 46.
Weasel, 53, 70, 99, 130.
Western Canner and Packer, 62.
Wetmore, Alexander, 36, 117.
Whale, 54; disappearing along California coast, 31; many, commercially extinct, 31.
Whaling, 31.
Whitebait, 39, 81, 127, 179.
Whitefish, 31, 39, 81, 89, 91, 127, 179; Montana plants, 42.
Wildcat, 32, 53, 70, 76; *see* bobcat.
Wildfowl, 123, 175; burning over waste lands, a menace to, 71.
Wild life, 26, 31, 61, 68, 85, 86, 101, 103, 113, 119, 155, 157, 159, 161, 176; Roosevelt, Station, 33; West Virginia organizes, league, 42; California, 68.
Williamson, George, Jr., remarkable flight of hawks, 125.
Wilson, Earl, 46.
Wisconsin Conservationist, 65.
Wishon, A. G., 113.
Wolf, 53, 69, 120, 133.
Wolverine, 120; the, 129-134.
Woodcock, 33, 71; California asked to introduce the American, 158-159.
Woodpecker, 36, 71.
Wood Pewee, Western, 36.
Woolgrowers, would blacklist black bear, 65.
Wurz, A. B., 58.

Y

Yearling, 110.
Yellowtail, 39, 81, 87, 88, 89, 91, 92, 93, 94, 95, 115, 127, 179.
Yosemite Nature Guide Service, 28.

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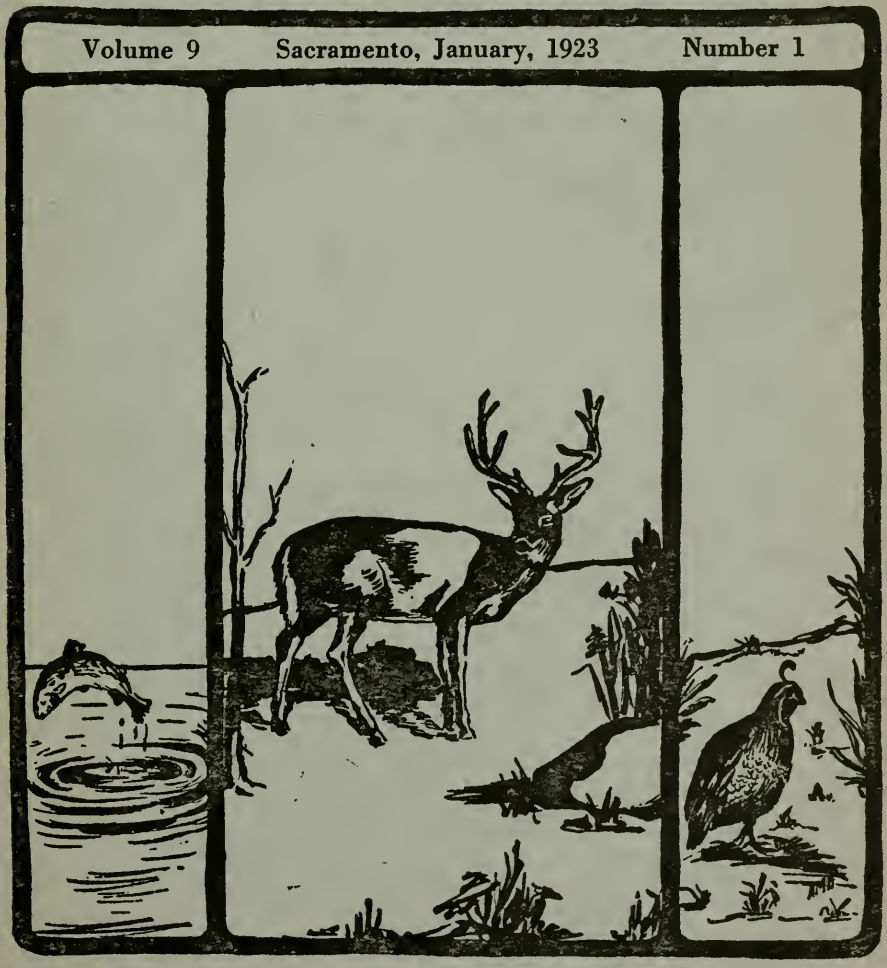
Volume 9 Sacramento, January, 1923 Number 1



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RABBITS (Cottontail and Bush)	ALL	Nov. 1-Jan. 15	15 per day, 30 per week
TREE SQUIRRELS	ALL	No Open Season	Closed until Sept. 1, 1925.
ELK. ANTELOPE, MOUNTAIN SHEEP	ALL	No Open Season	Killing Elk a felony.
SEA OTTER, BEAVER	ALL	No Open Season	$1,000 fine for Sea Otter.
BEAR, FUR ANIMALS	ALL	Oct. 15-Feb. 28	
DUCKS, GEESE, JACKSNIPE, MUD HENS	ALL	Oct. 1-Jan. 15	25 per day, except Geese. 8 Geese weekly limit. See law.
RAIL, WOODDUCK, PIGEONS, SHORE BIRDS	ALL	No Open Season	
QUAIL (Valley, Desert, Mountain)	ALL Except 1½	Nov. 1-Jan. 15	Valley, Desert, 15 per day. 30 per week. Mountain, 10 per day. 20 per week.
	1½	Oct. 15-Dec. 15	
SAGE HEN	ALL Except 4½	Aug. 1-Sept. 15	4 per day. 8 per week.
	4½	No Open Season	
DOVE	ALL	Sept. 1-Oct. 31	15 per day. 30 per week.
GROUSE	ALL	Sept. 15-Oct. 14	4 per day. 8 per week.
TROUT (Except Golden), WHITE FISH	1-1½-2-3-4-4½ Lake Almanor	May 1-Oct. 31	See Game Law Abstract.
	2½	July 1-Feb. 14	
	23-24-25	May 30-Oct. 31	
	Lakes, Etc.*	Aug. 1-Oct. 31	
	1½ Winter	Nov. 1-Dec. 31	
	2-3-10 Tidewater	Dec. 15-Feb. 28	
	2-2½-10 Spear	April 1-Jan. 31	
GOLDEN TROUT	ALL	June 30-Oct. 1	20 per day. None under 5 in.
BLACK BASS	ALL, Except 4e, Clear Lake	May 1-Nov. 30	25 per day. None under 7 in. No sale.
	4e, Clear Lake	No Closed Season	
SACRAMENTO PERCH, SUNFISH, CRAPPIE	ALL	May 1-Nov. 30	25 per day.
STRIPED BASS, SHAD	ALL	No Closed Season	See Game Abstract.
SALMON	ALL Except 15	No Closed Season	See Game Abstract.
	15	April 1-Aug. 31	
CRABS	ALL	Nov. 15-July 30	See Game Abstract.
ABALONES	ALL	Mar. 16-Jan. 14	See Game Abstract.
PISMO CLAMS	17	Sept. 1-April 30	See Game Abstract.
SPINY LOBSTER	ALL	Oct. 15-Feb. 28	See Game Abstract.

*Special provision; see Game Abstract.

HUNTING LICENSES

License Year from July 1 to June 30

Residents, $1.00. Non-residents, $10.00. Certain Aliens, $10.00. Other Aliens, $25.00.

ANGLING LICENSES

License Year from January 1 to December 31

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TRAPPING LICENSES

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 9 Sacramento, October, 1923 Number 4

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CALIFORNIA STATE PRINTING OFFICE
FRANK J. SMITH, Superintendent
SACRAMENTO, 1923

1921 ABSTRACT SPORTING FISH AND GAME LAWS 1923

OPEN SEASON INCLUDES BOTH DATES GIVEN.

SPECIES	DISTRICT	OPEN SEASON	BAG LIMITS, POSSESSION LIMITS, ETC.
DEER	1-1½-4½ 23-24-25-26	Sept. 1-Oct. 15	Two Bucks per season. No Does, Fawns, or Spike Bucks. No sale of venison or skins.
	2-2½-3	Aug. 1-Sept. 14	
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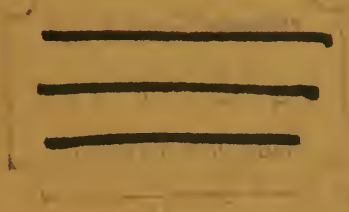
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